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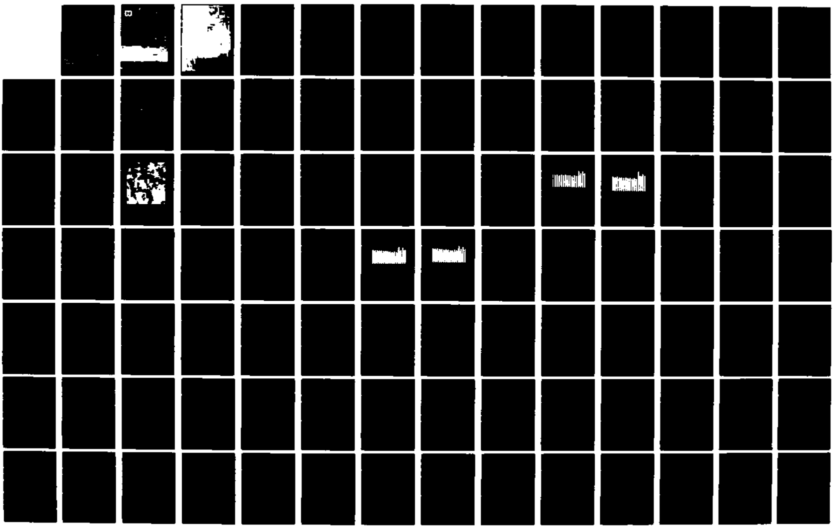

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LEVEL II

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TECHNICAL REPORT GL-82-10

MOBILITY ANALYSIS OF SELECTED LIGHTWEIGHT ARMORED WHEELED CONCEPT VEHICLES

by

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Final Report

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The study shows how the mobility performance of a 16-ton wheeled, light armored vehicle (LAV) is affected by systematic variations in number of axles, in tire size and/or in installed horsepower. The object of the study is to define the upper bounds of mobility performance for 16-ton wheeled LAV's as defined by these parameters, assuming the use in all cases of the best practical state-of-the-art suspensions matched to the overall vehicle configuration.

(Continued)

20. ABSTRACT (Continued).

The hull configuration of the parameteric vehicles derives from a 6x6 concept design developed by TACOM under the 1980-81 ACVT program. Twelve variations are examined in which changes in weight and geometry associated with power train and running gear variations are accounted for.

The study uses the ride dynamics module (VEHDYN) of the Army Mobility Model (AMM) for characterizing ride and shock characteristics of the study vehicles, AMM for making off-road and on-road performance predictions, the SWIMCRIT/WACROSS water-crossing model for analyzing linear feature crossings and the WES DASH model for computing acceleration performance.

Measures of mobility performance for the twelve study vehicles are developed using digital mobility-terrain data representing first the central highlands of the Federal Republic of Germany, and second northeast Jordan. These data bases, each covering about 500 km^2, are available from earlier WES studies.

Measures of mobility performance in each area are developed for each configuration. These are speed profiles on primary roads, on secondary roads, on trails, and off-road; percent of area impassable (NOGO) and percent of NOGO trail distances; reasons for immobilizations; and average times and speeds for standing-start dashes in the battlefield terrain. Predicted performances in dry, wet-wet slippery, and snow or sand conditions of the parametric vehicles are compared among themselves, and also to predictions for M1 Abrams Tank, M2 Bradley Infantry Fighting Vehicle, and two ACVT concept designs.

Appendices present detailed vehicle data needed by the several models, discuss the terrain data, and list the mobility performance data developed by the several models. A final appendix examines the confidence level of selected statistics deriving from AMM speed data.

PREFACE

Personnel of the U. S. Army Engineer Waterways Experiment Station (WES), CE, conducted the study described herein during the period August 1981 to April 1982 for the U. S. Marine Corps, Development and Education Command, Quantico, Virginia, under Purchase Request No. M95450-1-Z6 dated 19 August 1981 and Purchase Request No. M95450-2-K3 dated 16 November 1981.

The study was conducted under the general supervision of Dr. W. F. Marcuson III, Chief, Geotechnical Laboratory (GL); and Messrs. C. J. Nuttall, Chief, Mobility Systems Division (MSD), GL; and D. D. Randolph, Chief, Methodology and Modeling Group, MMG, MSD, GL. Mr. Randolph directed the overall study and was primarily assisted by Mr. Keafur Grimes, MMG. Messrs. R. P. Smith, R. H. Gilmore, and Mrs. Flossie B. Ponder, MMG, prepared the mobility predictions. Mr. R. G. Temple and Mrs. Edna P. Roberts, both of MMG, prepared the vehicle characteristics data, data tables, and graphics for this report. Messrs. Randolph and Grimes prepared this report.

COL Tilford C. Creel, CE, was Commander and Director of the WES during the course of this study and preparation of this report. Mr. Fred R. Brown was the Technical Director.

CONTENTS

Page

CONVERSION FACTORS, U. S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT

U. S. Customary units of measurement used in this report can be converted to metric (SI) units as follows:

Multiply	By	To obtain
foot-pounds (force)	1.355818	metre-newtons
horsepower (550 foot-pounds per second)	745.6999	watts
horsepower per ton	83.82	watts per kilonewton
inches	0.0254	metres
kips (force)	4.448222	kilonewtons
miles (U. S. statute)	1.609347	kilometres
miles (U. S. statute) per hour	1.609347	kilometres per hour
pounds (force)	4.448222	newtons
pounds (force) per square inch	6.894757	kilopascals
pounds (mass)	0.45359237	kilograms
square inches	6.4516	square centimetres
square miles	2.589998	square kilometres
tons (force)	8896.444	newtons
tons (2,000 lb, mass)	907.1847	kilograms

MOBILITY ANALYSIS OF SELECTED LIGHTWEIGHT ARMORED WHEELED CONCEPT VEHICLES

PART I: INTRODUCTION

Background

1. There is a growing worldwide interest in the use of lightweight armored vehicles. In the early 1970's the need for a highly mobile, helicopter-transportable weapon system to provide a landing force with assault fire support as well as an antiarmor capability became apparent. The need for this type of vehicle has increased since development of the Rapid Deployment Force. A number of lightweight armored vehicles were evaluated in the Armored Combat Vehicle Technology (ACVT) study (Murphy 1981); however, all except two of these vehicles were tracked.

2. The U. S. Marine Corps' interest in knowing more about the mobility performance of wheeled versions of lightweight armored vehicles led them to ask the U. S. Army Engineer Waterways Experiment Station (WES) to provide mobility analyses to answer the following questions:

- a. What is the difference in mobility performance of 4x4, 6x6, and 8x8 lightweight armored combat vehicles?
- b. What is the difference in mobility performance of lightweight armored vehicles equipped with 16.00 R20XS tires compared to those equipped with 14.00 R20XS tires?
- c. What is the difference in mobility performance of lightweight armored vehicles equipped with a 435 hp* engine compared to those equipped with a 655 hp engine?
- d. How do wheeled and tracked versions of the lightweight armored combat vehicles compare with some current military vehicles?

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* A table of factors for converting U. S. customary units of measurement to metric (SI) units is presented on page 4.

Objective

3. The objective of the WES study was to provide an analysis to define the upper boundaries of mobility which can be expected of lightweight armored wheeled vehicles.

Scope

4. The principal activities necessary to achieve the WES objective were as follows:

- a. The VEHDYN dynamics model (Murphy and Ahlvin 1976) of the Army Mobility Model (AMM) was used to establish ride and shock relations for the study vehicles.
- b. The AMC-74X version of AMM (Nuttall and Randolph 1976) was used to predict off-road and on-road performance of the study vehicles in selected study areas in the Federal Republic of Germany and the Mid-East. Performance predictions are included in terms of speed profiles for the dry, wet-wet slippery, sand, and snow surface conditions on the primary roads, secondary roads, trails, and off-road; and in terms of percent NOGO (immobilization) and reason for NOGO off-roads and on trails.
- c. The SWIMCRIT water-crossing and WACROSS methodology (Nuttall 1979) was used to predict water-crossing performance of the study vehicles in the selected study areas in the Federal Republic of Germany and the Mid-East.
- d. The WES DASH model (Murphy 1981) was used to provide data on the dash capabilities of the study vehicles in the dash-maneuver terrain units in selected study areas in the Federal Republic of Germany and the Mid-East.

Contents of Report

5. This report contains a main text and four appendices. The main text describes the methodology, discusses the principal inputs, and presents and assesses the main results. Appendix A describes the complete vehicle data used by the predictive models and gives the general

content of the terrain data base used in this study. Appendix B gives the detailed mobility data developed using the AMM, SWIMCRIT/WACROSS, and DASH models. Appendix C gives the computation of mobility rating speeds for tactical mobility levels. Appendix D explains the confidence level of the AMM speed predictions.

Definitions

6. The following are definitions of terrain and vehicle terms:

   a. Cone index (CI). An index of the shearing resistance of a medium obtained with a cone penetrometer.

   b. Remolding index (RI). A ratio that expresses the proportion of the original strength of a soil that will be retained after traffic of a moving vehicle.

   c. Rating cone index (RCI). The product of the RI and the average of the measured in situ CI for the same layer of soil.

   d. Vehicle cone index (VCI). The minimum RCI that will permit a vehicle to complete a specified number of passes; thus, VCI_{50} means the minimum RCI necessary to complete 50 passes, and VCI_1 means the minimum RCI to complete 1 pass.

   e. V_{50}, V_{80}, V_{90}, V_{100}. The average speed a vehicle can maintain over a given percentage, designated by the subscript number, of the best terrain in a given area where the vehicle can make higher speeds. Thus, V_{80} means average speed of a vehicle over the 80 percent of the area in the terrain in which that vehicle makes the highest speeds.

   f. On-road. When the vehicle is operating on primary roads, secondary roads, or trails.

   g. Off-road. When the vehicle is operating cross-country or is not negotiating a specific path.

PART II: STUDY VEHICLES, TERRAIN DATA, AND SURFACE CONDITIONS

Study Vehicles

Lightweight armored wheeled concept vehicles

7. Twelve lightweight armored concept vehicles were evaluated in this study. All 12 of these concept vehicles were based on the basic hull design of the ACVT Concept 5 vehicle. A drawing of the ACVT Concept 5 is shown in Figure 1. The major differences among the lightweight armored wheeled concepts are shown in Table 1. A summary of the most important vehicle characteristics is given in Table 2. The complete list of vehicle characteristics and performance data used by AMM to make mobility predictions for the concept vehicles is given in Appendix A.

8. The 8x8 vehicle with 16.00 R20XS tires, 655-hp engine was estimated to have a gross vehicle weight of 16 tons. All the other vehicle weights are adjusted downward from the 16 tons. The weight of each vehicle was dependent on tire, suspension, transmission, and engine weights. All other component weights were held constant except the hull weight of the 8x8 with 16.00 R20XS tires. The hull length of the 8x8 with 16.00 R20XS tires was increased to accommodate the larger tires, and an appropriate weight increment was added.

Comparison vehicles

9. Four vehicles were selected from the ACVT study (Murphy 1981) as comparison vehicles. They were:

- a. ACVT Concept 3, a light armored tracked vehicle weighing 32,000 lb.
- b. ACVT Concept 5, a light armored wheeled vehicle weighing 32,000 lb.
- c. The M2 Infantry Fighting Vehicle.
- d. M1 tank.

A summary of the important characteristics of the comparison vehicles is given in Table 3.

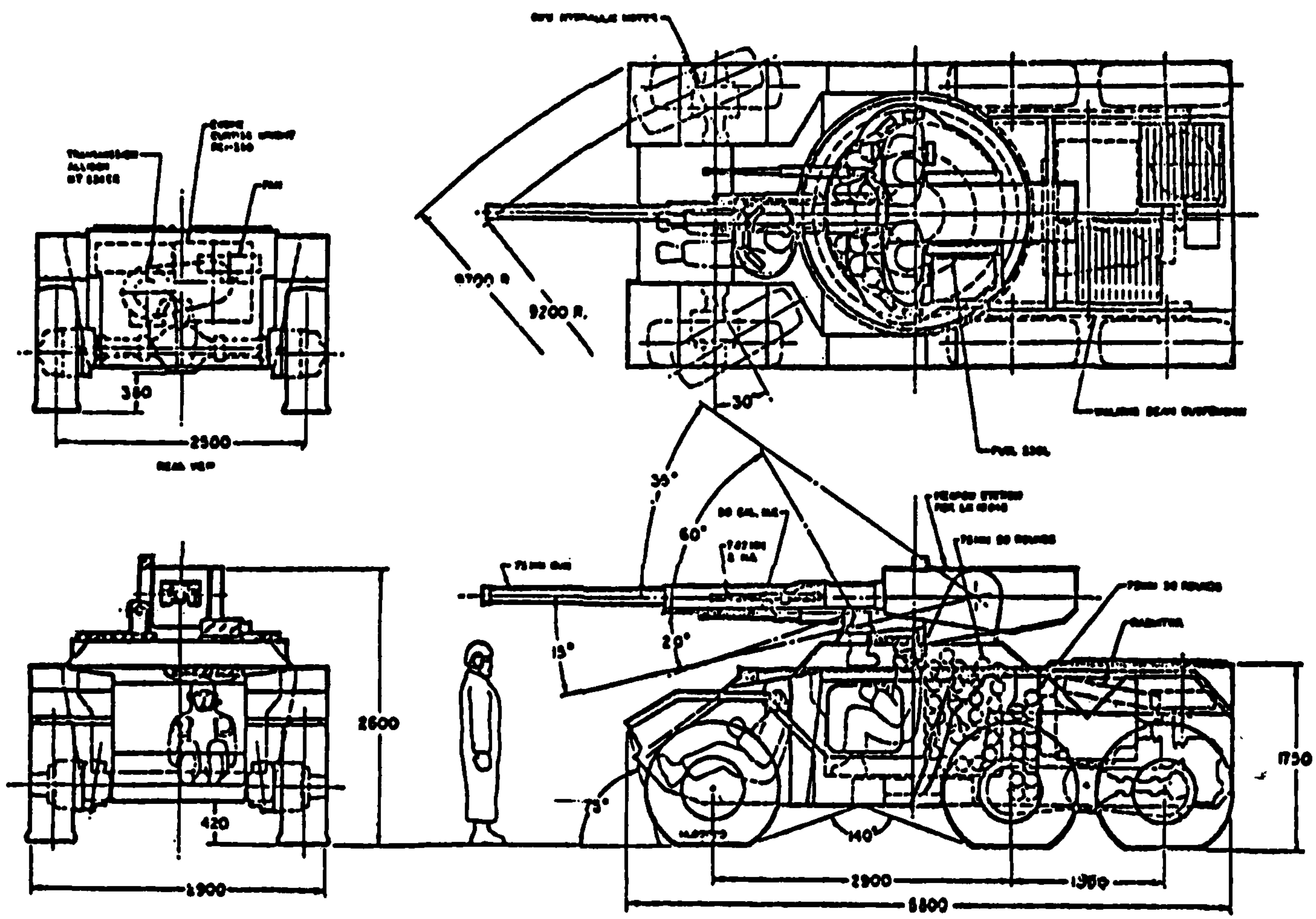


Figure 1. The ACVT Concept 5 vehicle (from Purri, Morten, and Seyfert 1980)

Terrain Data

10. AMM was used to predict the performance of each study vehicle in the off-road terrain in the Lauterbach 1:50,000 scale Quad (L5322) and the on-road network in the Schotten quad (L5520) (no road data were available for Lauterbach quad) in the Federal Republic of Germany. AMM was also used to predict the performance of each study vehicle in the off-road terrain and on-road network in the Mafraq quad (3254) in the Mid-East. The locations of the Lauterbach and Schotten quads in the Federal Republic of Germany are given in Figure 2 and the location of the Mafraq quad is given in Figure 3.

11. The SWIMCRIT model and WACROSS methodology were used to predict the gap-crossing and/or support needs performance of the study vehicles in the Lauterbach quad in the Federal Republic of Germany and the Mafraq quad in the Mid-East. These are the same quads used for performance predictions with AMM in off-road terrains.

12. The WES DASH model was used to predict the dash performance of the study vehicles for ACVT study areas selected within Fulda and Bad Hersfeld-Hunfeld quads in the Federal Republic of Germany and the Mafraq quad in the Mid-East. These subareas are the potential hill-zones where high dash and maneuver performance can be used to improve survivability. Locations of these subareas are also shown in Figures 2 and 3.

Road and areal terrain data

13. The road and areal terrain (off-road) data were prepared by WES from maps at a scale of 1:50,000 under a number of previous programs beginning with the HIMO study (Nuttall and Randolph 1976). The resulting maps used to describe the road and areal terrain units used in this study were considered to be "study-quality" maps. That is, specific values for many terrain factors involved were largely inferred from available qualitative data sources interpreted in the context of local climate, cultural practices, etc., but little or no ground truth data were used. As a result, it cannot be guaranteed that the specific set of factor values assigned to a given point on a map will, in fact, be found at that point on the ground.

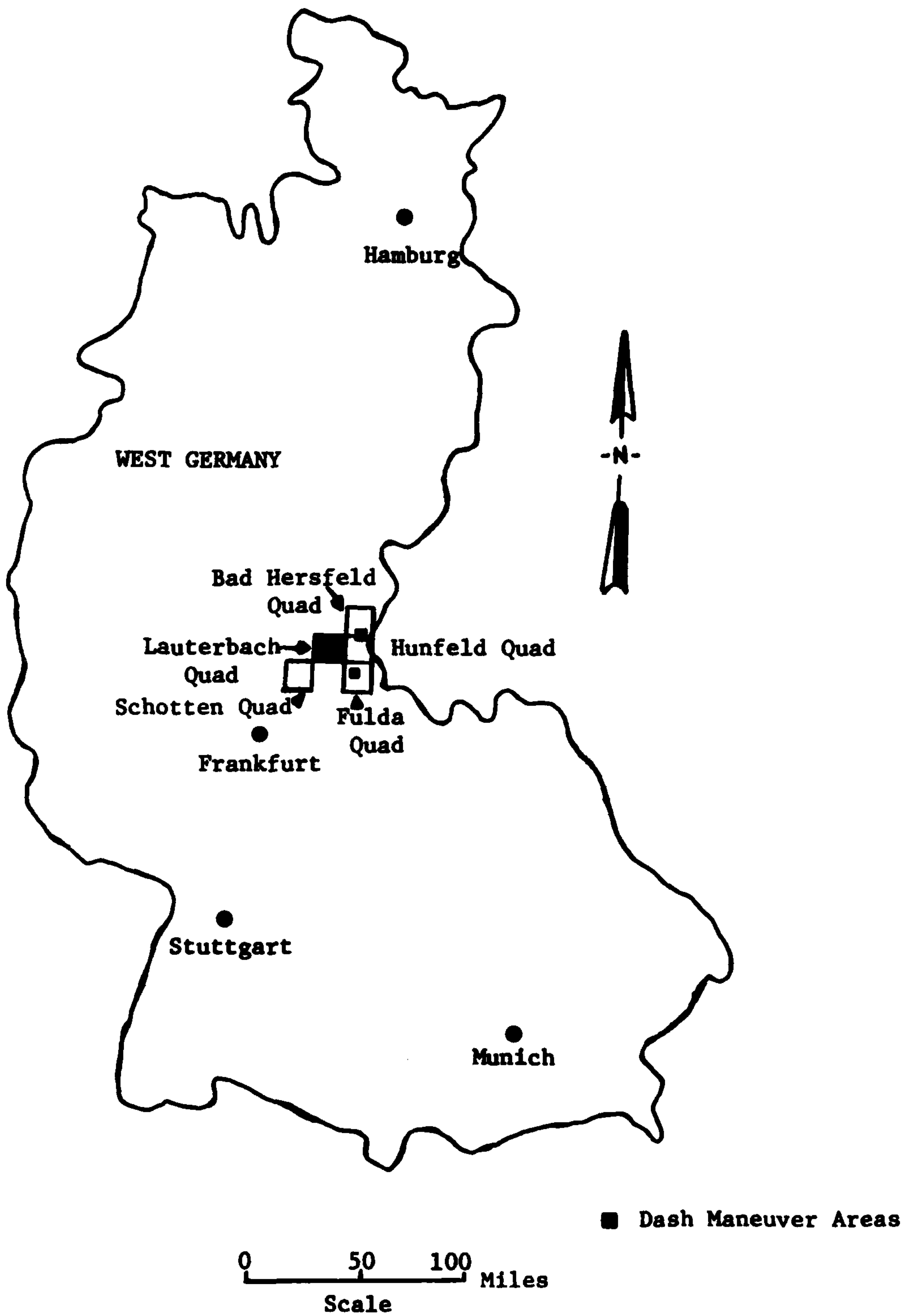


Figure 2. Location of the Federal Republic of Germany study areas

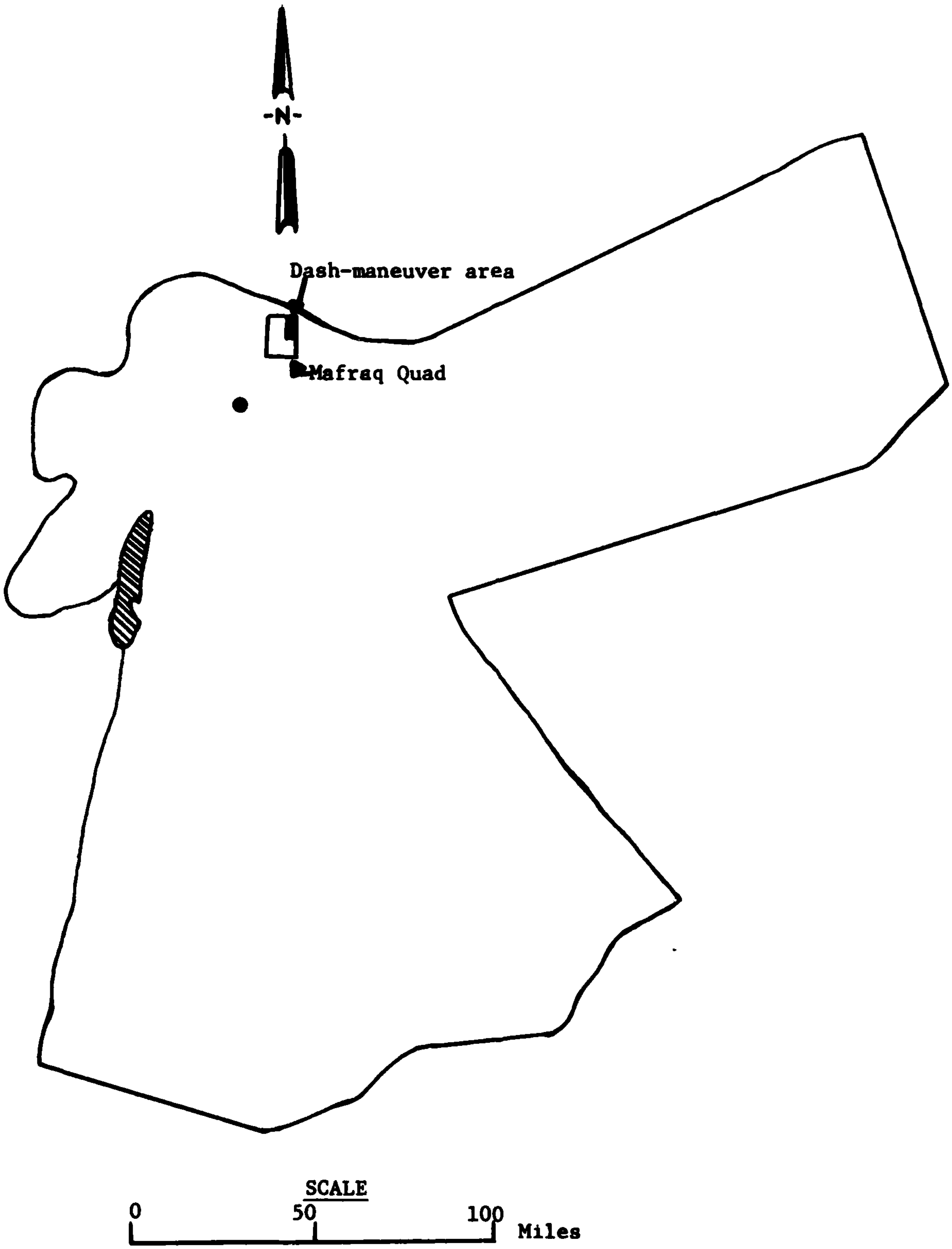


Figure 3. Location of the Mid-East study areas

14. However, it is believed that the area as mapped is generally representative of the levels, associations, and areal distributions of those factors influencing vehicle mobility performance throughout this area as a whole.

15. It is felt that the study-quality road and areal terrain data for the quads in the Federal Republic of Germany and the quads in the Mid-East are acceptable for comparing the study vehicles.

Linear features

16. The linear feature data for this study were also study quality and were developed for the WACROSS study (Nuttall 1979). These data describe the gap-crossing demands of each area. These data are considered representative of the linear features in the study areas.

Surface Conditions

17. The surface conditions of areal terrain and road data for this study were considered to be dry, wet-wet slippery, and covered with snow for the study areas in the Federal Republic of Germany and dry, wet-wet slippery, and sand conditions for the study areas in the Mid-East. The associated water stage was high, average, or low, as appropriate.

Dry condition

18. The dry condition is described as a long, dry period when the surface is mostly dry and firm. It is generally the most favorable condition for vehicle cross-country mobility. The water stage is low for the Federal Republic of Germany and average for the Mid-East under dry surface conditions.

Wet-wet slippery condition

19. The wet-wet slippery condition is described as an excessively wet period during rain. The wet condition is generally the worst condition for vehicle cross-country mobility because of high soil moisture content and associated reduced soil strengths. The assumption of continuing rain makes the situation less favorable still because of

potential slipperiness on soils whose strength would otherwise be adequate for vehicle flotation and traction. The water stage is high for both the Federal Republic of Germany and Mid-East study areas under the wet surface conditions.

Snow condition

20. The snow condition (Federal Republic of Germany only) assumes that the terrain and trails are frozen and uniformly covered by 10 in. of dry snow, which is a reasonable average maximum depth for the area. Differences in snow depth or snow characteristics in forested areas or due to snow drifting are not considered. The water stage of the linear features is average in the Federal Republic of Germany study area.

Sand condition

21. In the Mid-East study area, predictions were made for a condition in which the actual terrain was arbitrarily converted to an all-sand terrain to represent sand dunes. This was accomplished as follows:

a. Converting all actual soils to dry desert sand with appropriately reduced strengths.

b. Doubling all slopes to a maximum of 60 percent (the approximate angle of repose of dune sands frequently found on the lee side of desert dunes).

Characteristics of all roads and trails were unchanged, except the soil-surfaced trails were assumed to be trails in sand. These changes are considered reasonable for an exploration of vehicle and fleet performance in large expanses of sand dune terrain but are synthetic. The water stage was average under the sand condition in Jordan.

PART III: MOBILITY PREDICTIONS

Ride and Shock Performance Predictions

22. The VEHDYN model (Murphy and Ahlvin 1976) was used to predict the ride and shock performance of the test vehicles. The ride and shock performances are listed in Appendix A in Tables A4 and A5.

Ride prediction

23. Ride quality over continuous but rough terrains is presently based on absorbed power at the driver's seat and is used as a basis for assessing the speed at which a driver will operate his vehicle. Absorbed power as a ride severity criterion was established through laboratory tests at the U. S. Army Tank-Automotive Command (TACOM) several years ago (c.f. Pradko and Kaluza 1966). Six watts of absorbed power was established as a reasonable standard human tolerance limit for vibrations in the vertical direction. Results of field tests indicate that a driver will not willingly subject himself to more than 6 watts for more than 30 minutes at a time. Accordingly, the vehicle speed at 6 watts of absorbed power is currently used as the speed-limiting criterion in AMM.

24. The speeds versus root mean square (rms) roughness at 6 watts of absorbed power for the 12 study vehicles are shown in Figure 4. Also included in Figure 4 for comparison purposes are the ride curves for the ACVT Concept 5, ACVT Concept 3, and M1 and M2 vehicles.

Shock prediction

25. The ability of vehicles to negotiate abrupt discrete obstacles is an important aspect of vehicle ground mobility. Logs, boulders, rice paddy dikes, etc. are encountered frequently in off-road travel and produce speed-controlling shock load. Past research has shown that obstacle height is a suitable first-order descriptor for characterizing such discrete obstacles. The response criterion currently used for limiting vehicle speed is the level at which the driver's vertical acceleration reaches 2.5 g's. This response criterion is used in AMM in the prediction of vehicle performance over discrete obstacles.

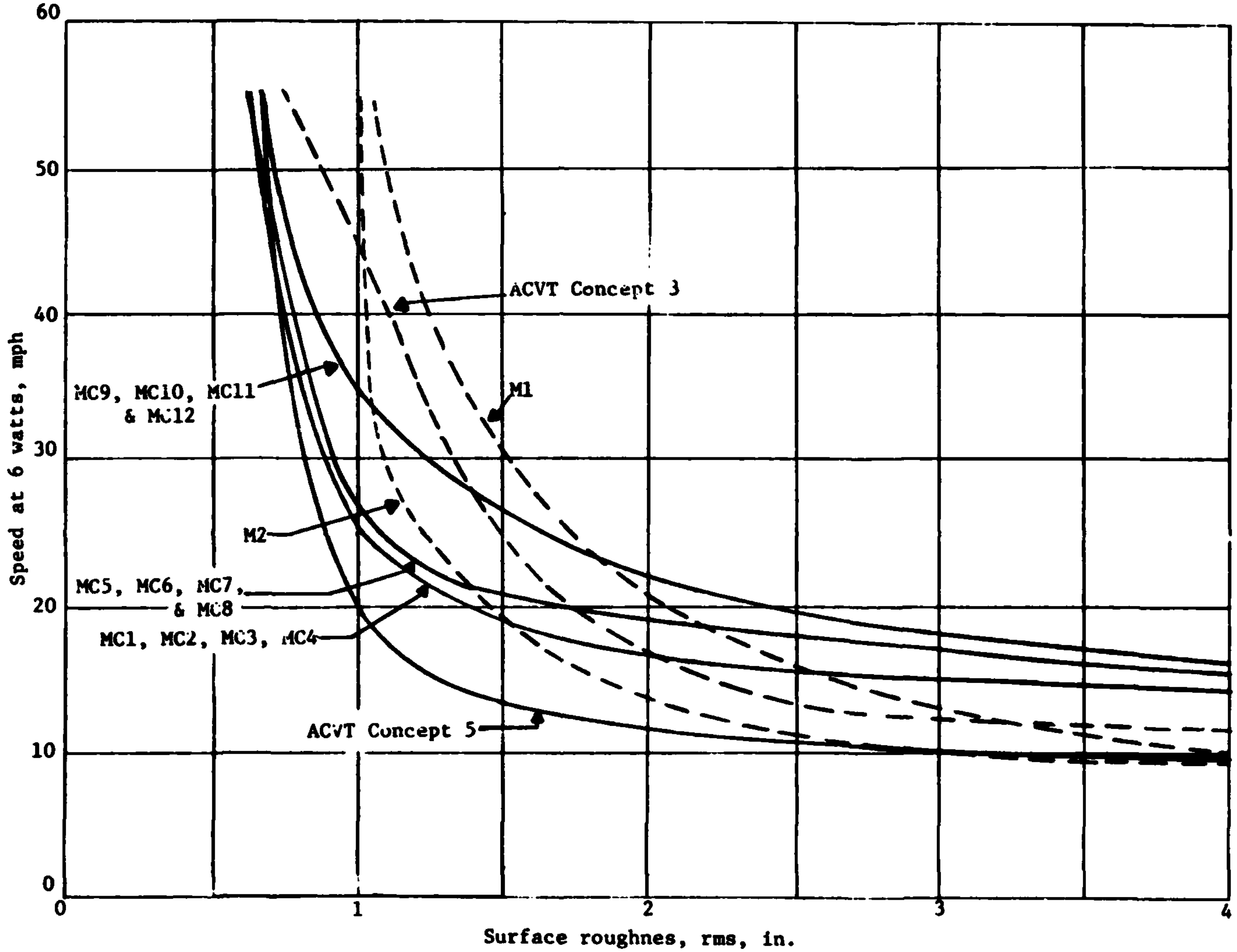


Figure 4. Ride performance

26. The obstacle height versus vehicle speed curves for the three groups of study vehicle configurations are shown in Figure 5. Also included in Figure 5 are the obstacle height-speed curves for the ACVT Concept 5, ACVT Concept 3, M1, and M2 vehicles for comparison purposes.

AMM Mobility Predictions

27. AMM was used to predict on- and off-road performances for the study vehicles for the dry, wet-wet slippery, and snow conditions in the study areas in the Federal Republic of Germany, and the dry, wet-wet slippery, and sand conditions for the Mid-East study area. The version of AMM used in this study (AMC-74X) was the first-generation AMC-71 with a number of significant improvements in the predictive algorithms. The inputs to this model are vehicle characteristics and a quantitative terrain description of the study area. The general content of the terrain data base is indicated and the detailed vehicle characteristics and performance data for the study vehicles required for AMM are given in Appendix A.

28. The basic output from AMM is the maximum feasible speed for a given single vehicle in each road or terrain unit. The AMM output data for the entire study area can be displayed directly as a speed map or statistically as a speed profile. The output selected for use in this study is the speed profile.

29. The off-road speed profile for a given vehicle, terrain, and surface condition shows the average speed the vehicle can sustain as a function of the percentage of the total area under consideration that it avoids, under the assumption that it avoids areas posing the greatest impediment to its motion. An example of an off-road speed profile is given in Figure 6. This sample speed profile shows, at point A, that the MC1 can average 19.0 mph while negotiating the best 80 percent of the terrain in the study area and avoiding the worst 20 percent of the terrain in the same study area.

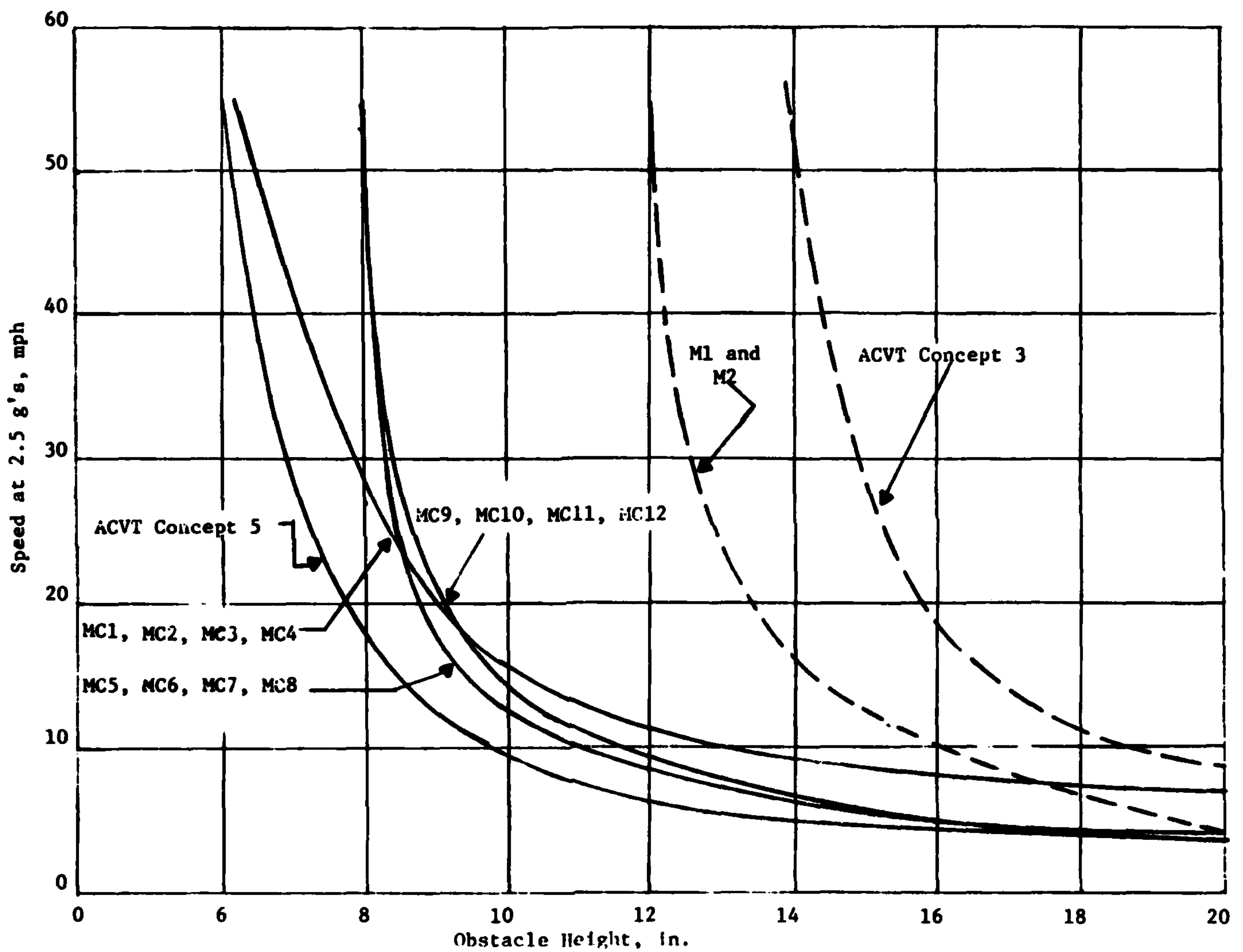
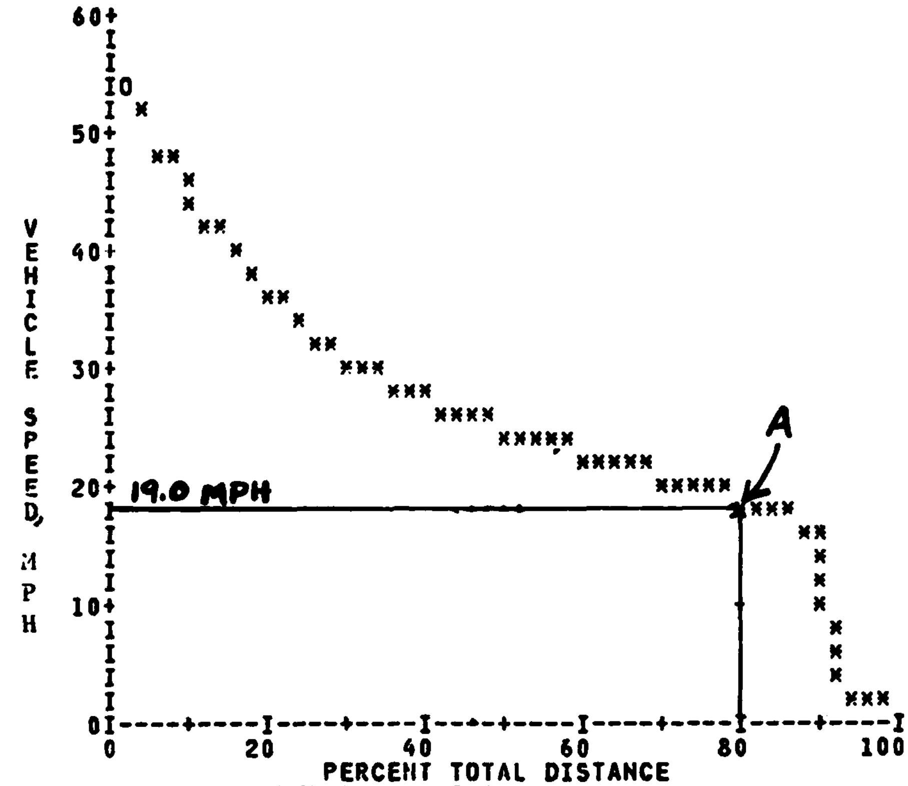


Figure 5. Shock performance

Lauterbach Quad in the Federal Republic of Germany
Vehicle: MC1 4x4 14.00 R20XS tires, 435 hp



PERCENT DISTANCE "NO-GO" = 9.4

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	53.3	50.8	48.7	47.2
1X	45.0	42.8	41.2	39.4	37.8
2X	36.4	35.1	33.9	32.8	31.8
3X	30.9	30.1	29.3	28.6	28.0
4X	27.4	26.8	26.3	25.8	25.4
5X	24.9	24.5	24.1	23.7	23.3
6X	22.9	22.5	22.1	21.7	21.3
7X	20.9	20.6	20.2	19.8	19.4
A 8X	19.0	18.5	18.1	17.6	16.9
9X	15.3	4.4	2.3	1.6	1.2
10X	1.0				

ACCUMULATED SPEED

Figure 6. Off-road speed profile data

30. The on-road speed profile for a given vehicle, road (primary or secondary road or trails), and surface condition shows the average speed the vehicle can sustain as a function of the percentage of the total distance under consideration that it avoids, under the assumption that it avoids road or trail segments posing the greatest impediment to its motion. An example of an on-road speed profile is given in Figure 7.

31. The speed profiles for each of the study vehicles on primary roads, secondary roads, and trails during dry, wet-wet slippery, and snow surface condition of the Schotten road network and for the same surface conditions of the off-road terrain in the Lauterbach quad are given in Appendix B in Tables B1-B12. Speed profiles for the dry, wet-wet slippery, and sand surface conditions of the Mafraq quad are given in Appendix B in Tables B13-B24.

32. There were no NOGO's on primary and secondary roads. The percent of NOGO's for trails and off-road terrain and the reason for the NOGO's during the dry, wet-wet slippery, and snow conditions in the Schotten and Lauterbach quads are given in Appendix B in Table B25. The percent NOGO on trails and off-road terrain and the reason for the NOGO during the dry, wet-wet slippery, and sand conditions in the Mafraq quad are given in Appendix B in Table B26.

Linear Feature Performance Predictions

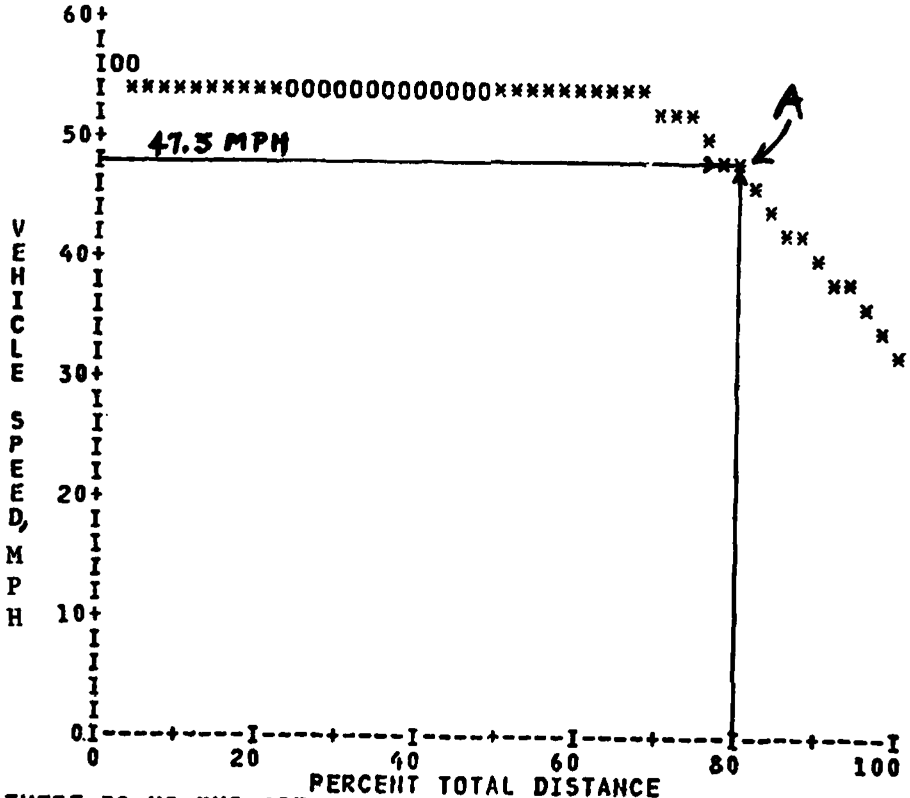
33. The linear feature performance predictions were made using the SWIMCRIT water-crossing model and the terrain description of the linear features in the Lauterbach and Mafraq quads. The characteristics of the study vehicles required for the SWIMCRIT water-crossing model are given in Appendix A.

34. The WACROSS methodology was used to determine (for each vehicle, for three seasonal water stages, and for the area):

a. The mean number of stream crossings necessarily negotiated per mile during cross-country travel.

b. The mean time required to effect a single crossing.

Schotten Quad in the Federal Republic of Germany
Vehicle: MC1 4x4 14.00 R20XS tires, 435 hp



THERE IS NO "NO-GO" DISTANCE

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	54.9	54.8	54.6	54.4	54.3
6X	54.1	54.0	53.9	53.7	53.5
7X	53.0	52.2	51.1	50.1	48.8
8X	A 47.3	45.8	44.3	42.9	41.2
9X	39.7	38.3	37.1	35.8	34.2
10X	32.6				

ACCUMULATED SPEED

Figure 7. Speed profile data for primary roads

35. The methodology, as applied, examined the WACROSS digitized linear feature data for the areas covered by eighteen 1 by 22 km sample strips across the area depicted on the Lauterbach quad (L5322) located in the Federal Republic of Germany. Nine samples were north-south transects, and nine were east-west transects. Moving from one end of each transect to the other, the computerized process avoids crossings when possible without going outside the transect bounds and where water crossings are unavoidable, selects the optimum crossing site. A site where the given vehicle can successfully cross without assistance is chosen as the optimum site when it exists. Otherwise, the site chosen requires a minimum of critical engineer resources (bulldozers, bridges, etc.) to prepare the site for successful crossing. The construction time required is computed based upon site characteristics and added to an arbitrary waiting time of 1 hr. The mean time per crossing is given by: (total construction and waiting time for all crossings)/(total number of crossings). Since vehicles are rarely used on single-vehicle missions, the crossing time assessed a single vehicle is taken to be one-tenth of the computed value. This is equivalent to spreading the crossing "expense" among 10 vehicles.

36. The product of the mean time per crossing and the number of crossings per mile of off-road terrain traversed gives a water-crossing coefficient having units of hours per mile. This index provides a simple comparative measure of a vehicle's gap-crossing ability and the coefficient can be expected to change from area to area. Table B27 in Appendix B presents these coefficients for each vehicle for three surface conditions in the Lauterbach and Mafraq Quads.

37. It is realized that this scenario may not be the most reasonable one for lightweight armored vehicles, but it does give the same gap-crossing challenge to each vehicle and allows a direct comparison with other study vehicles such as ACVT concept vehicles.

Tactical Mobility Levels

38. The mobility performance of a vehicle is a complex function of the vehicle's characteristics, the terrain in which it is operating, and the task it is required to do. Expressing mobility performance in a minimal reduced set of comprehensive numbers to aid in making decisions is a formidable task.

39. The WHEELS study (U. S. Army Engineer Waterways Experiment Station and the U. S. Army Tank-Automotive Command 1972) defined three levels of tactical mobility associated with forward area logistical support. These are listed in Table 4 along with the definitions for two further mobility levels (high-high and on-road mobility), which were added during the HIMO study for completeness. In the HIMO study, each of the resulting five levels of mobility was also quantitatively described in terms of the following statistical performance data:

- a. Percentage of off-road travel expected of the vehicle.
- b. The severity of expected off-road travel (in terms of percentage of the off-road terrain that should be negotiable).
- c. The severity of expected travel on trails (in terms of percentage of trails that should be negotiable).

In computing on-road speeds, separate predictions were made for primary roads, for secondary roads, and for trails in accordance with constraint c above. The percentage of on-road travel was subdivided into the same categories according to the relative mileage of each found in the road network for the area developed in the HIMO scenario play (Table 5). Assignment for the vehicle of proper percents of total off-road travel, on primary roads, on secondary roads, and on trails, along with the appropriate corresponding values of mean speeds in each travel category level permitted calculation of an average mobility rating speed that the vehicle could be expected to maintain area-wide in the stated weather condition while performing missions requiring a stated level of mobility. Procedures used to calculate mobility rating speeds are described in Appendix C.

Dash Performance Predictions

40. During the ACVT study, it was decided that some terrain was unsuited for scenarios that used maneuver and dash tactics to increase survivability. Urban areas and forests were considered unsuitable, as was terrain with extremely rough surfaces, steep slopes, large obstacles, or very soft soils that would prevent a vehicle from making higher speeds, and therefore, minimize the advantage of dash and maneuver tactics. The portion of a study area in which dash-maneuver tactics were considered to be most likely to take place were called dash-maneuver areas. An example of areas considered to be dash-maneuver areas is given in Figure 8.

41. The dash model predicts the speed-time-distance relation for a vehicle from a standing start up to a specified distance (500 meters* was used in this study) for up-slope, across-slope, and down-slope runs in each dash terrain unit (patch of homogenous terrain). The average dash speed is determined for each of the three slope conditions by dividing the specified distance (500 m) by the respective elasped time. The average dash speed for a given dash-maneuver terrain unit is the harmonic average of the average speed up, across, and down the slopes and is determined by the expression:

$$V_{avg} = \frac{3}{\frac{1}{V_{up}} + \frac{1}{V_{across}} + \frac{1}{V_{down}}}$$

The maximum speeds achieved for up-, across-, and down-slope dashes are also recorded and the maximum dash speed achieved in a given dash-maneuver terrain unit represents the arithmetic average of the three and is given by the expression:

$$V_{max} = \frac{V_{max(up)} + V_{max(across)} + V_{max(down)}}{3}$$

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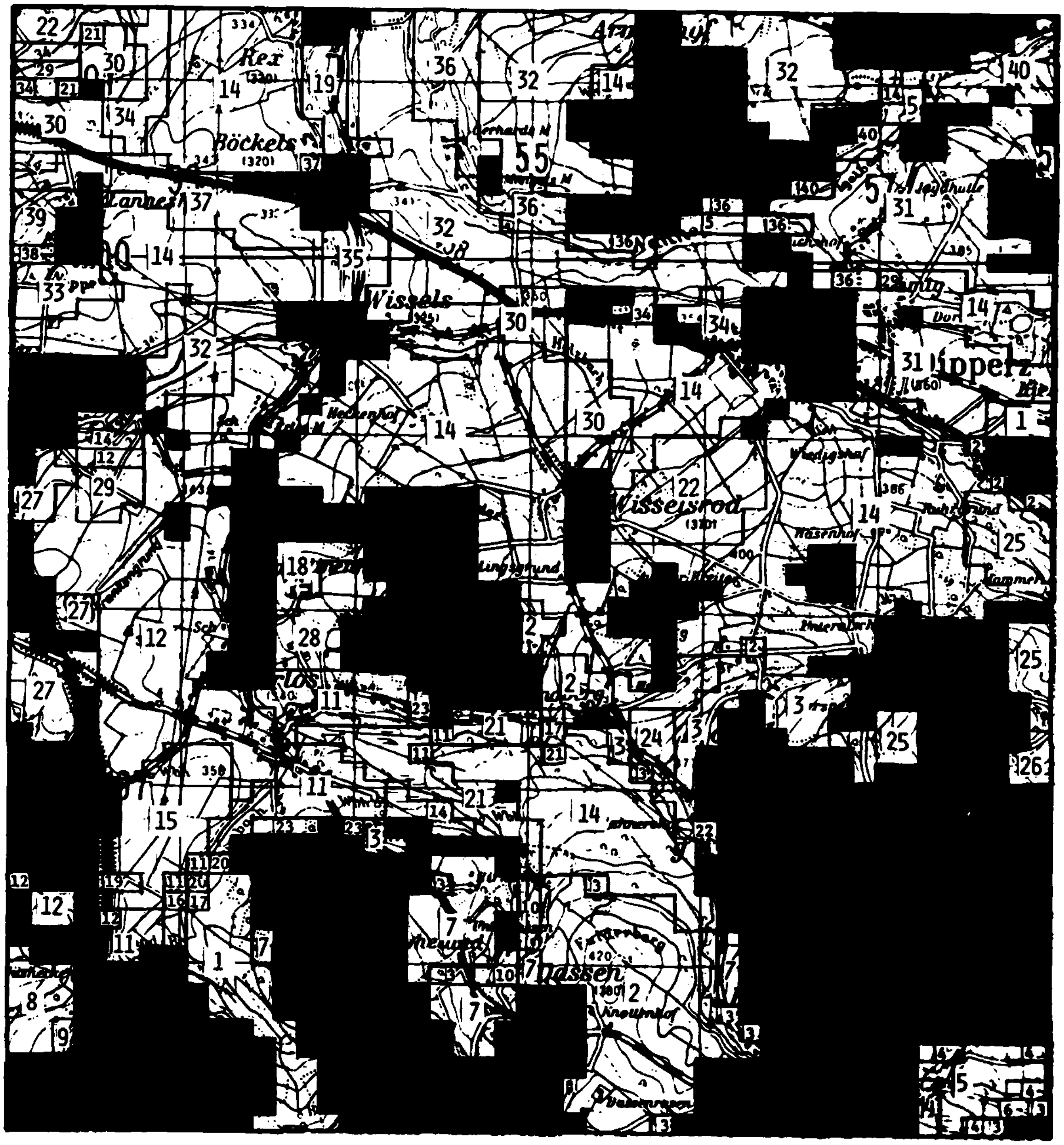
* Dash distances are specified in meters rather than the U. S. customary units.



Areas suitable for dash-maneuver (66.1% study area)

Areas unsuitable for dash-maneuver

Total Dash-Maneuver Study Area = 38.7 sq. km

0 500 1000 m

Figure 8. Dash-maneuver areas

These average and maximum speeds represent the dash capabilities without regard to a specific path of travel assuming equal amount of travel up, across, and down slopes.

42. The dash capabilities of a vehicle are evaluated over the entire area of operation by weighting the speed in each dash-maneuver terrain unit in accordance with the area of the respective dash-maneuver terrain unit. For example, the average dash speeds for the entire area are given by the expression:

$$V_{avg} \text{ (all dash-maneuver terrain units)} = \frac{V_1 A_1 + V_2 A_2 \ldots + V_n A_n}{\text{Total area suitable for dash-maneuver}}$$

where V_1 = average speed in dash-maneuver terrain unit 1

A_1 = area of dash-maneuver terrain unit 1

This speed represents the overall dash capability of a vehicle challenging all dash-maneuver terrain units in the study area.

PART IV: MOBILITY ASSESSMENT OF STUDY VEHICLES IN SELECTED AREAS IN THE FEDERAL REPUBLIC OF GERMANY

Off-Road Performance

43. The off-road mobility of the study vehicles is compared using the AMM off-road speed profile data and percent NOGO for the Lauterbach quad. The on-road mobility of the study vehicles is compared using the AMM on-road speed profile data for the Schotten quad. The confidence level of the AMM speed data is discussed in Appendix D. The mobility rating speeds at the tactical standard mobility level are used to compare the study vehicles' mobility over a scenario containing a combination of off- and on-road movement. The average time required for the study vehicles to dash 500 m in each dash-maneuver terrain unit within the route established dash maneuver areas (paragraph 40) is also used to compare the mobility of the study vehicles. Comparisons of the off-road, on-road, tactical support mobility, and dash performances were made among the concept vehicles and the best 4x4, 6x6, and 8x8 concept vehicles were established. The best concept vehicles were then compared with all of the study vehicles. Finally, the study vehicles are compared using a utility curve for V_{80} and percent NOGO.

44. A summary of the speed profile and percent NOGO data for the dry, wet-wet slippery, and snow surface conditions for the Lauterbach quad is given in Table 6. Only the V_{50} and V_{80} speeds and percent NOGO are discussed in this comparison.

Concept vehicles

45. The 4x4 concept vehicles equipped with 16.00 R20XS tires and 655-hp engine (MC4) had only slightly higher V_{50} and V_{80} speeds and a slightly smaller percent NOGO than the concept vehicle equipped with 14.00 R20XS tires and 435-hp engine (MC1) during the dry and snow surface conditions. The 4x4 concept vehicle equipped with 16.00 R20XS tires and 435-hp engine (MC3) had similar V_{50} speed, significantly greater V_{80} speed, and a smaller percent NOGO than either MC1 or MC4 during the wet-wet slippery surface condition. MC3 clearly has the best off-road

mobility of the 4x4 concept vehicles when all surface conditions are considered.

46. All the 6x6 concept vehicles (MC5, MC6, MC7, and MC8) have similar V_{50} and V_{80} speeds on percent NOGO. The MC7 equipped with 16.00 R20XS tires and 435-hp engine is selected as having the best off-road mobility of the 6x6 concept vehicles due to its slightly lower percent NOGO during the wet and snow surface conditions.

47. The 8x8 concept vehicle equipped with the 635-hp engine and 16.00 R20XS tires (MC12) had slightly lower V_{50} and V_{80} speeds and percent NOGO than the concept vehicle equipped with the 435-hp engine and 14.00 R20XS tires (MC10) during the dry condition. MC12 also had the highest V_{50} and V_{80} speeds of the 8x8 concept vehicles (MC9, MC10, MC11, and MC12) and the same percent NOGO as the concept equipped with 435-hp and 16.00 R20XS tires (MC11) during the wet-wet slippery condition. The MC12 and the MC10 had the higher V_{50} and V_{80} speeds, and MC11 and MC12 had the lower percent NOGO during the snow surface condition. Although MC12 has slightly higher overall off-road mobility than MC11, it is considered that the larger engine does not give a significantly better performance to justify the larger engine, therefore, MC11 is assigned the 8x8 concept vehicle with the best off-road mobility for all surface conditions.

48. The best 8x8 concept vehicle (MC11) has slightly greater V_{50} and V_{80} speeds and an equal or slightly smaller percent NOGO than the best 6x6 concept vehicle (MC7) during all of the surface conditions. The top 8x8 concept vehicle (MC11) has somewhat greater V_{50} speed and slightly greater V_{80} speed and a significantly lower percent NOGO than the best 4x4 concept vehicle MC3 for all surface conditions. The 8x8 concept vehicle (MC11) is selected as having the best overall off-road mobility of the concept vehicles.

Study vehicles

49. Selected speed profile and percent NOGO data for selected concept vehicles (MC3, MC7, and MC11) and the comparison vehicles are given in Table 7. Only the V_{50} and V_{80} speeds and percent NOGO are used in comparing these vehicles.

50. ACVT Concept 3 had the highest V_{50} and V_{80} speeds and the lowest percent NOGO of the study vehicles during the dry surface condition, but did not have significantly higher V_{50} and V_{80} than the MC11. All of the tracked vehicles (ACVT Concept 3, M1, and M2) had a significantly lower percent NOGO than the wheeled vehicles (MC3, MC7, MC11 and ACVT Concept 5) during the dry surface condition. The V_{50} and V_{80} for the MC3, MC7 and MC11 exceeded that of the M1 and M2 vehicles.

51. MC11 had the highest V_{50} and ACVT Concept 3 had the highest V_{80} and lowest percent NOGO of the study vehicles during the wet-wet slippery surface condition. MC7 (6x6 concept vehicle) and MC11 (8x8 concept vehicle) did not have a significantly lower V_{80} speed than ACVT Concept 3 (tracked vehicle). All of the tracked vehicles had significantly lower percent NOGO during the wet-wet slippery surface condition than the wheeled vehicles. The V_{50} and V_{80} of the MC7 and MC11 exceeded that of the M1 and M2.

52. ACVT Concept 3 had the highest V_{50} and V_{80} speed and the lowest percent NOGO of the study vehicles during the snow surface condition. MC7 and MC11 had similar V_{50} and better V_{80} than the M1. All of the tracked vehicles had significantly less percent NOGO than the wheeled vehicles.

On-Road Performance

Concept vehicles

53. The speed profile data (V_{100}) for the concept vehicles on primary roads, secondary roads, and trails for the Schotten quad were used to compare the concept vehicles' on-road mobility. These data are given in Table 6.

54. All of the concept vehicles had similar V_{100} during the dry, wet-wet slippery, and snow surface conditions of the primary road and secondary roads. All of the 4x4 concept vehicles had similar V_{100} on trails during the dry and snow surface conditions, and all except the M2 (14.00 R20XS tires and 655-hp engine) had similar V_{100} on trails during the wet-wet slippery surface conditions. The MC2 had significantly less

mobility during the wet-wet slippery condition due to the weight of the larger engine. All of the 6x6 concept vehicles had similar V_{100} values on trails for all of the conditions. All of the 8x8 concept vehicles had similar mobility on trails for all surface conditions. The 8x8 study vehicles had higher V_{100} on trails than the 6x6 concept vehicles. The 4x4 concept vehicles had the lowest V_{100} on trails of the concept vehicles. The better suspension systems, which can be designed for a vehicle with more axles, accounts for the better V_{100} on trails of the 8x8 concept vehicles.

55. The large tires and large engine did not significantly increase the V_{100} of the concept vehicles on-road, but the better suspension systems of the 8x8 concept vehicles did significantly increase the V_{100} speeds on trails.

Study vehicles

56. The speed profile data (V_{100}) for the concept vehicles on primary roads, secondary roads, and trails for the Schotten quad were used to compare the study vehicles (MC3, MC7, and MC11 represent better concept vehicles). These data are given in Table 7.

57. MC3 had the highest V_{100} on primary and secondary roads of the study vehicles during the dry and wet-wet slippery surface conditions. MC11 had the highest V_{100} on trails of the study vehicles during the dry and wet-wet slippery surface conditions. The M1 had the highest V_{100} on primary roads of the study vehicles during the snow and wet-wet slippery conditions. The M1 and MC7 had the highest V_{100} on secondary roads of the study vehicles during the snow surface condition. The M1 and MC11 had the highest V_{100} on trails of the study vehicles during the snow surface condition.

Tactical Standard Mobility

Concept vehicles

58. The mobility rating speeds for the concept vehicles during the dry, wet-wet slippery, and snow surface conditions of the Lauterbach-Schotten quads for each tactical mobility level are given in Table 8.

The concept vehicles were compared at only the tactical standard mobility level.

59. All of the concept vehicles (MC1-MC12) have similar mobility rating speeds at the tactical standard mobility level during the dry surface condition. The 8x8 concept vehicles (MC9-MC12), when equipped with the same tires and engine, have slightly better mobility rating speeds during the wet-wet slippery and snow surface conditions than the 6x6 concept vehicles (MC5-MC8) and significantly greater mobility rating speeds during the wet-wet slippery and snow surface conditions than the 4x4 concept vehicles.

Study vehicles

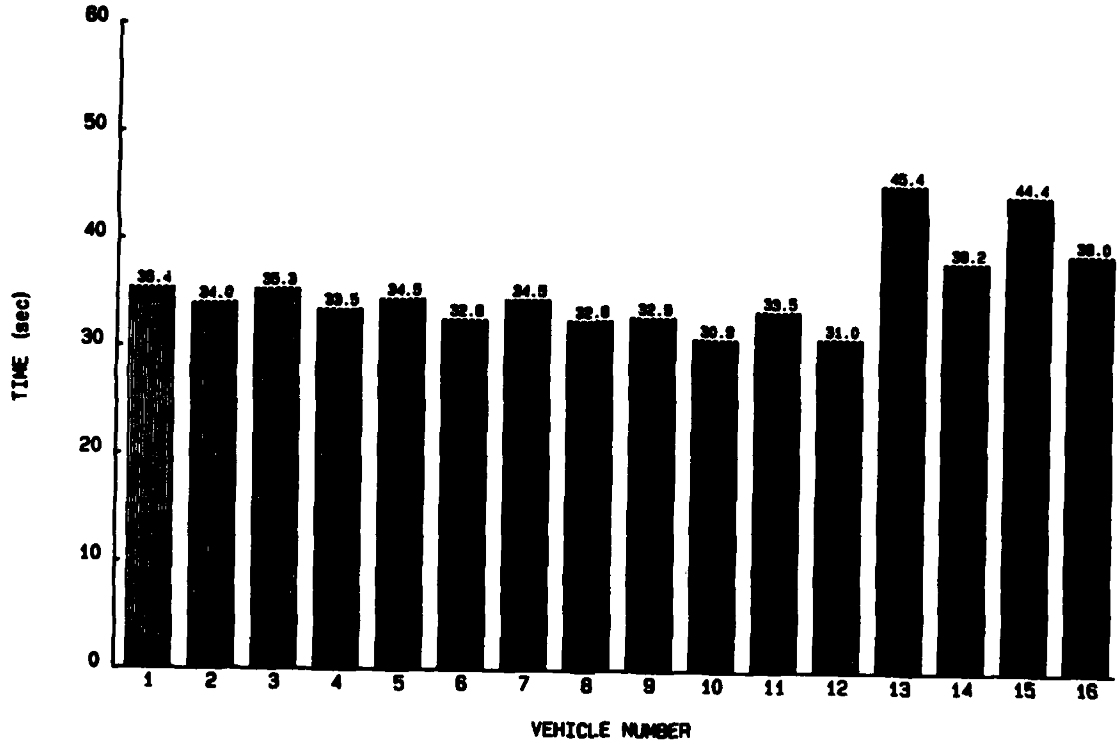
60. The mobility rating speed for the concept vehicles (MC3, MC7, and MC11) and the comparison vehicles at the tactical standard mobility level are given in Table 9.

61. The M1 had the highest mobility rating speed at the tactical standard mobility level of the study vehicles during the dry and wet-wet slippery surface conditions. The ACVT Concept 3 had the highest mobility rating speed at the tactical standard mobility level of the study vehicles during the snow surface condition. The tracked vehicles had somewhat higher mobility rating speeds at the tactical standard level of mobility than the wheeled concept vehicles (MC3, MC7, MC11); however, the ACVT Concept 5 (wheeled) was much lower than concept vehicles MC3, MC7, and MC11.

Dash Mobility

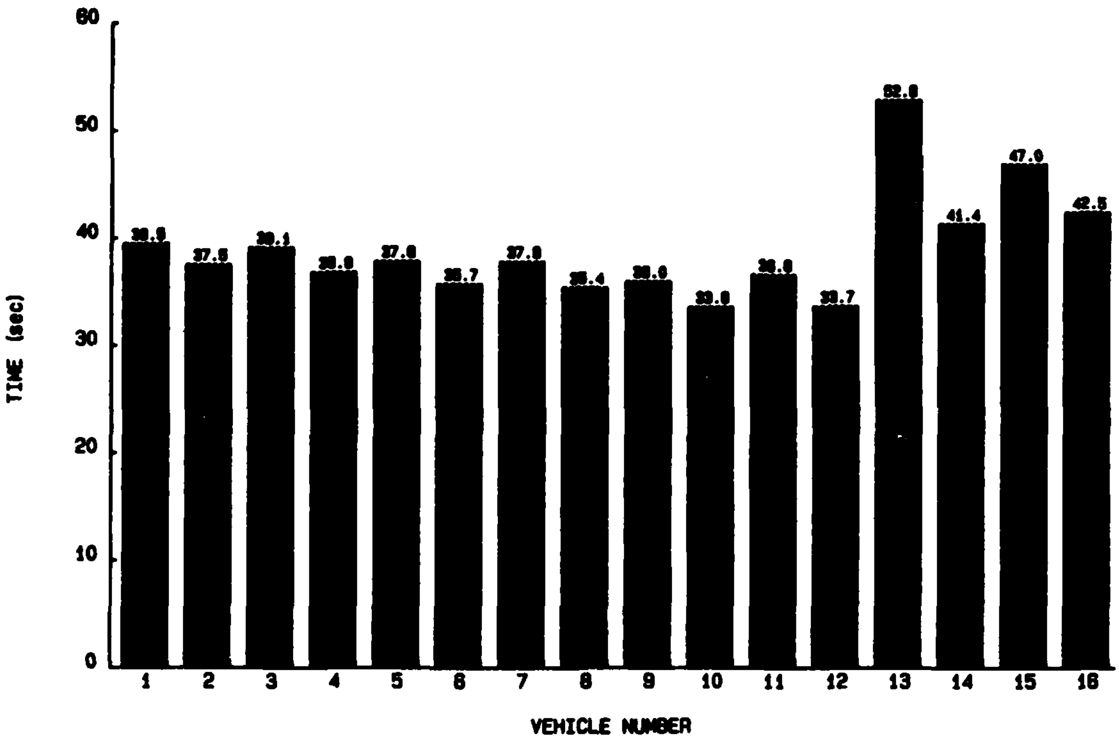
Concept vehicles

62. The dash mobility performance in terms of the average speed and average time for the concept vehicles to complete 500-m dashes in the dash-maneuver areas in the Federal Republic of Germany are given in Table 10. The times to complete 500-m maneuvers are also shown in the form of bar graphs in Figures 9 and 10. The concept vehicles are compared based on the time to complete 500-m dashes.



LEGEND			
1	MC1	9	MC9
2	MC2	10	MC10
3	MC3	11	MC11
4	MC4	12	MC12
5	MC5	13	ACVT Concept 5
6	MC6	14	ACVT Concept 3
7	MC7	15	M2
8	MC8	16	M1

Figure 9. Dash time (sec) for study vehicles, Federal Republic of Germany, dry condition



LEGEND

1	MC1	9	MC9
2	MC2	10	MC10
3	MC3	11	MC11
4	MC4	12	MC12
5	MC5	13	ACVT Concept 5
6	MC6	14	ACVT Concept 3
7	MC7	15	M2
8	MC8	16	M1

Figure 10. Dash time (sec) for study vehicles, Federal Republic of Germany, wet-wet slippery condition

63. The 8x8 concept vehicles with the 655-hp engines (MC10 and MC12) had the lowest dash times, followed by the 6x6 concept vehicles with 655-hp engines (MC6 and MC8) having the next lowest dash times for both the dry and wet-wet slippery surface conditions. The 4x4 concept vehicles with the 655-hp engine (MC2 and MC4) had the lowest dash time of the 4x4 concept vehicles for both the dry and wet-wet slippery surface conditions.

Study vehicles

64. All of the concept vehicles (MC1-MC12) had lower dash times than the comparison vehicles. This is due to the higher horsepower-to-weight ratio and good suspension design.

Utility Curves

V_{80}

65. The U. S. Marine Corps (USMC) provided the utility curve shown in Figure 11 and asked WES to compare the study vehicles based on that curve. The utility curve represents the utility value given by USMC to various V_{80} speeds in the Federal Republic of Germany during wet-wet slippery conditions.

66. In the Federal Republic of Germany study area (Lauterbach quad), the MC3 had the best V_{80} speed of the 4x4 vehicles and still did not rate on the utility curve. All of the 6x6 and 8x8 vehicles rated on the curve and had a utility between 37 and 41 percent. There is little difference in the utility of 6x6 and 8x8 vehicles in the Federal Republic of Germany under the wet-wet slippery condition.

67. The ACVT Concept 5 vehicle had a V_{80} of 7.4 mph and did not rate on the utility curve. All track comparison vehicles had a utility of 58 percent or above. The ACVT Concept 3 had a utility of 79 percent in the Federal Republic of Germany study area.

Percent NOGO

68. The cross-country percent NOGO utility curve represents the percent of terrain that a vehicle cannot negotiate. It reflects ground pressure, trench crossings, obstacles, gradients, vegetation, etc. In

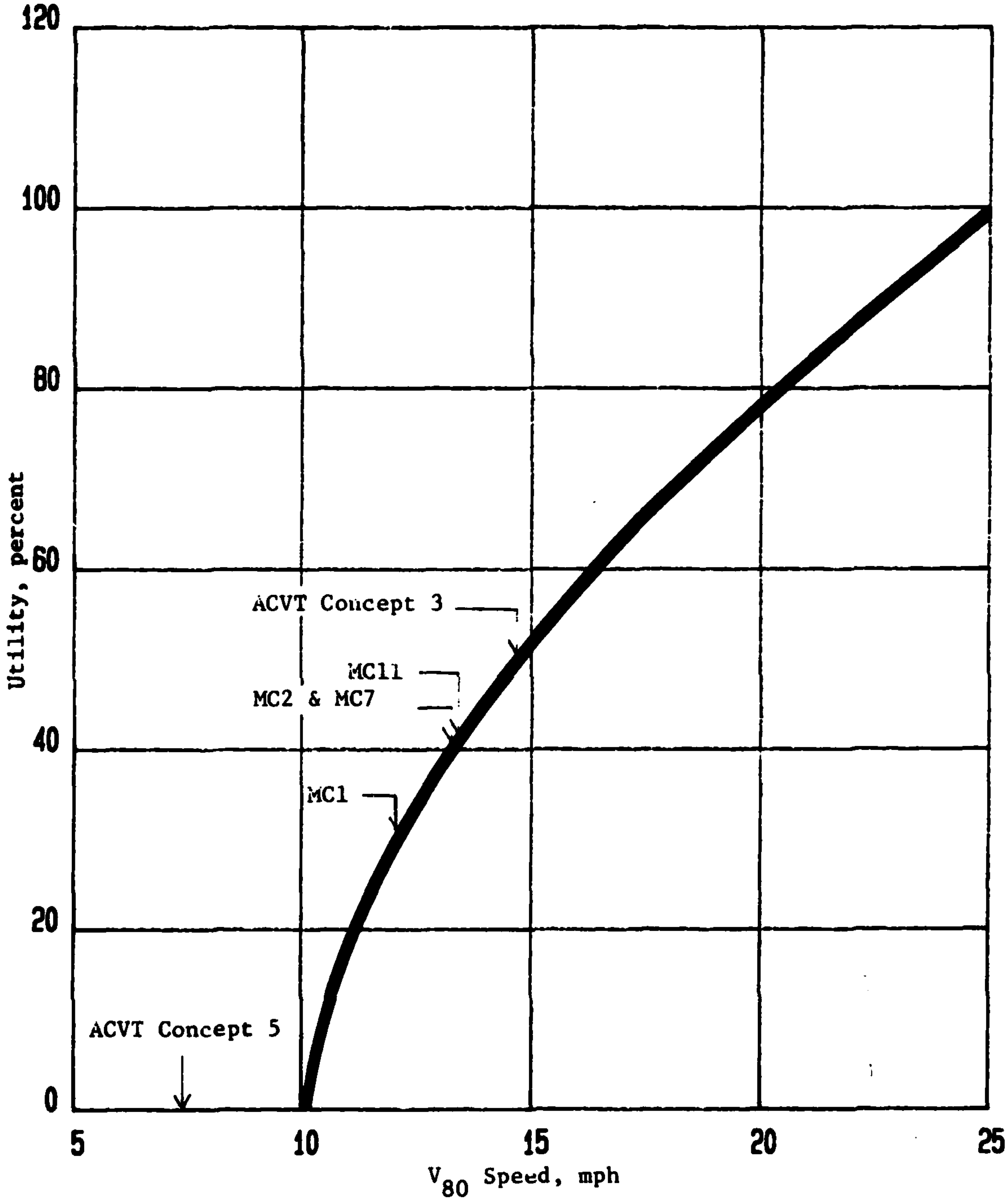


Figure 11. Cross-country V_{80} speed versus utility, Federal Republic of Germany, wet-wet slippery surface condition

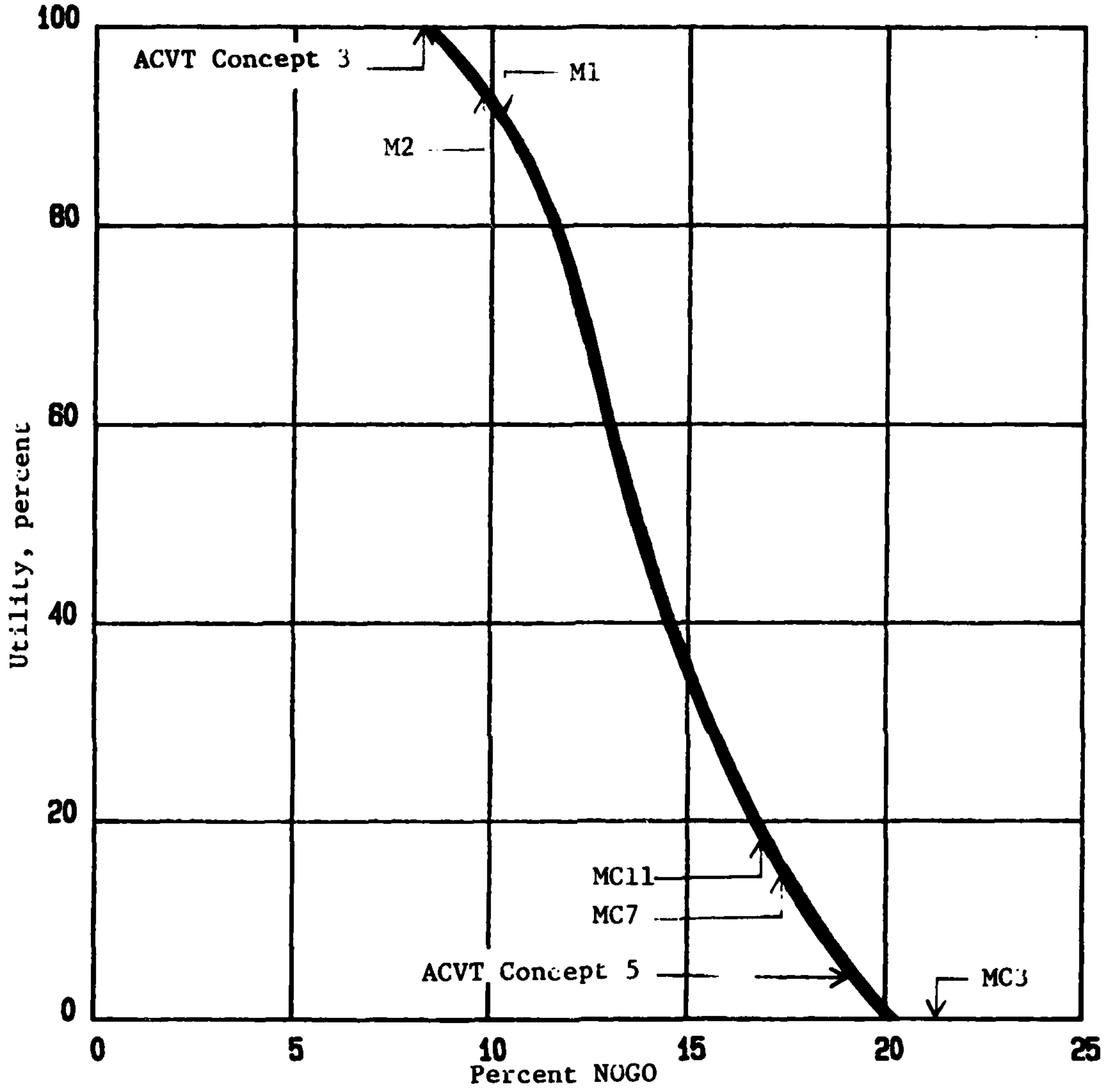


Figure 12. Cross-country percent NOGO versus utility, Federal Republic of Germany, wet-wet slippery surface condition

the curve provided by the Marine Corps, wet earth and a northern Germany terrain was used; however, the study area used for this study was the Lauterbach quad in central Germany. This quad was used so the concept vehicles could be compared to the ACVT vehicles. The Lauterbach area in many respect presents more severe terrain than that used in the development of the cross-country percent NOGO utility curve originally given by the Marine Corps. The M1 changed from a percent NOGO of 4.0 in the northern Germany terrain to a percent NOGO of 10.2 in the Lauterbach terrain. A new curve was therefore necessary for the cross-country percent NOGO. This curve was developed by adjusting the Marine Corps curve to place the M1 and M2 at about the 90 percent utility level in this terrain, as it was in the original Marine Corps evaluation in the more northern terrain.

69. In establishing the new curve, the ACVT Concept 3 was set at 100 percent utility, the M1 was set at 92 percent utility, and 0 percent utility was set at a percent NOGO of 20, because anything with a NOGO of more than 20 percent was considered to be of little value to the Marine Corps.

70. The curve was set up using the same basic shape as the curve given for the northern Germany terrain. Both curves have a range of 20 percent NOGO. The M1 was set at 92 percent on both the curves provided and the curve WES prepared. Both curves drop 65 points in utility at the midpoint between the M1 and 20 percent NOGO point.

71. All of the wheeled study vehicles had a large NOGO percent in the Federal Republic of Germany study area under the wet-wet slippery surface condition. The MPWS 4x4 vehicles did not rate on the utility curve, while the 6x6 and 8x8 vehicles rated but had a utility of less than 20 percent.

72. All of the tracked comparison vehicles had a utility of 90 percent or more. Wheeled vehicles could not compete with tracked vehicles in terms of NOGO under wet-wet slippery surface conditions in the Federal Republic of Germany study area.

PART V: MOBILITY ASSESSMENT OF STUDY VEHICLES IN A SELECTED AREA IN THE MID-EAST

73. The off- and on-road mobility of the study vehicles are compared using the AMM percent NOGO and speed profile data for the Mafraq quad. The mobility rating speeds at the tactical standard mobility level were also used to compare the study vehicles over a scenario containing both off- and on-road movement in the Mafraq quad. The average time required for the study vehicles to dash 500 m in each dash-maneuver terrain unit in the dash-maneuver area (see paragraph 40) is used to compare the dash mobility of the study vehicles. Finally, the study vehicles are compared using a utility curve for V_{80} and percent NOGO.

Off-Road Mobility

Concept vehicles

74. A summary of the off-road speed profiles and percent NOGO data for the concept vehicles for the dry, wet-wet slippery, and sand condition for the Mafraq quad is given in Table 6. Only the V_{50}, V_{80}, and percent NOGO are discussed in this comparison.

75. Each of the 4x4 concept vehicles (MC1 and MC4) had similar V_{50} and V_{80} speeds during the wet surface condition. The 4x4 concept vehicles with the 16.00 R20XS tires (MC3 and MC4) had a slightly lower percent NOGO during the dry surface condition and a significantly lower percent NOGO than the 4x4 concept vehicles equipped with 14.00 R20XS tires (MC1 and MC2) during the wet surface condition. The 4x4 concept vehicles with the 16.00 R20XS tires (MC3 and MC4) had slightly higher V_{50} speed, much higher V_{80} speed, and much less percent NOGO than the 4x4 concept vehicles equipped with 14.00 R20XS tires (MC1 and MC2) during the sand surface condition. The 4x4 concept vehicles with the 655-hp engine (MC2 and MC4) did not show any significant improvement in V_{50} and V_{80} speeds or percent NOGO over the 4x4 concept vehicles equipped with 435-hp engine (MC1 and MC3) during any surface condition. The MC3

was selected as the concept vehicle with the best off-road mobility since the small improvements in mobility of the larger engine in MC4 would not justify the need for the larger engine.

76. The 6x6 concept vehicles equipped with 16.00 R20XS tires (MC7 and MC8) had similar V_{50} and V_{80} speeds and a slightly lower percent NOGO than the 6x6 vehicles equipped with 14.00 R20XS tires (MC5 and MC6) during the dry and wet-wet slippery surface conditions. The 6x6 concept vehicles equipped with 16.00 R20XS tires (MC7 and MC8) had slightly higher V_{50} and V_{80} speeds and a significantly lower percent NOGO than the 6x6 concept vehicles equipped with 14.00 R20XS tires (MC5 and MC6) during the sand surface condition. The 6x6 concept vehicles equipped with the 655-hp engine (MC6 and MC8) did not show any significant improvement in V_{50} and V_{80} speeds or percent NOGO over the 6x6 concept vehicles equipped with the 435-hp engine (MC5 and MC7) during any surface condition. The MC7 was selected as the 6x6 concept vehicle with the best off-road mobility since the small improvement in off-road mobility due to the larger engine in the MC8 would not justify the need for the larger engine.

77. All of the 8x8 concept vehicles (MC9-MC12) had similar V_{50} and V_{80} speeds during the dry, wet-wet slippery, and sand surface conditions. The 8x8 concept vehicles with the 16.00 R20XS tires had a slightly lower percent NOGO during the dry and wet-wet slippery surface conditions and a significantly lower percent NOGO during the sand surface condition than the concept vehicles equipped with 14.00 R20XS tires. The MC11 was selected as the 8x8 concept with the best off-road mobility since the small improvement in off-road mobility due to the larger engine in the MC12 would not be worth the increased cost of the engine.

78. The 8x8 vehicle concept selected as having the best off-road mobility (MC11) had significantly higher V_{50} and V_{80} speeds and a slightly lower percent NOGO than the 6x6 vehicle concept selected as having the best off-road mobility (MC7) during the dry and wet-wet slippery surface conditions. The MC11 also had slightly higher V_{50} and V_{80} speeds and a slightly lower percent NOGO than the MC7 during the sand surface

condition. Both the 8x8 concept vehicle (MC11) and 6x6 concept vehicle (MC7) had significantly higher V_{50} and V_{80} speeds for the dry, wet-wet slippery, and sand surface conditions than the 4x4 concept vehicle during the dry, wet-wet slippery, and sand surface condition.

Study vehicles

79. Selected speed profile and percent NOGO data for the selected concept vehicles (MC3, MC7, and MC11) and comparison vehicles are given in Table 11. Only the V_{50}, V_{80}, and percent NOGO were used in comparing the study vehicles.

80. ACVT Concept 3 and MC11 had the higher V_{50} speed of the study vehicles during the dry surface condition. MC11 had the highest V_{80} speed of the study vehicles during the dry surface condition. All of the tracked study vehicles had significantly less percent NOGO than the wheeled study vehicles during the dry surface condition.

81. ACVT Concept 3 had the highest V_{50} and V_{80} speeds and the lowest percent NOGO of the study vehicles during the wet-wet slippery and sand surface conditions. The MC11 had only slightly lower V_{50} and V_{80} speeds than the ACVT Concept 3 and had slightly higher to significantly higher V_{50} and V_{80} speeds than the M1 and M2 during the wet-wet slippery and sand surface conditions. All of the tracked study vehicles had a significantly lower percent NOGO than the wheeled study vehicles.

On-Road Mobility

Concept vehicles

82. The speed profile data (V_{100}) for primary roads, secondary roads, and trails for the Mafraq quad were used to compare the concept vehicles. These data are given in Table 6.

83. All of the concept vehicles had similar V_{100} speeds on primary and secondary roads during the dry, wet-wet slippery, and sand surface conditions. The 8x8 concept vehicles (MC9-MC12) had the highest V_{100} speeds on trails during the dry and wet surface conditions. The 8x8 concept vehicles equipped with 16.00 R20XS tires (MC11 and MC12) had the highest V_{100} speed of the concept vehicles during the sand surface

condition. The better suspension system of the 8x8 accounted for the higher V_{100} during the dry and wet-wet slippery surface conditions and the better suspension coupled with larger tires accounted for the MC11 and MC12 having the higher V_{100} speeds during the sand surface condition.

Study vehicles

84. The speed profile data (V_{100}) for primary roads, secondary roads, and trails for selected concept vehicles (MC3, MC7, and MC11) and the comparison vehicles are given in Table 12.

85. The MC3 had the highest V_{100} speed of the study vehicles on primary and secondary roads during the dry surface condition. The MC11 had the highest V_{100} speed of the study vehicles on trails during the dry surface condition.

86. The MC3 had the highest V_{100} speed of the study vehicles on primary roads during the wet-wet slippery and sand surface conditions. The MC3 and MC7 had the highest V_{100} speed of the study vehicles on secondary roads during the wet-wet slippery and sand surface conditions. The MC11 had the highest V_{100} speed of the study vehicles on trails during the wet-wet slippery surface condition. The M1 had the highest V_{100} speed of the study vehicles on trails during the sand surface condition. All of the tracked study vehicles had much higher speeds on trails during the sand condition than the wheeled study vehicles.

Tactical Standard Mobility

Concept vehicles

87. The mobility rating speeds for the concept vehicles during the dry, wet-wet slippery, and sand surface conditions of the Mafraq quad for each tactical mobility level are given in Table 13. The concept vehicles were compared at only the tactical standard mobility level.

88. The 8x8 concept vehicles (MC9-MC12) had the highest mobility rating speeds of the study vehicles during the dry and wet-wet slippery surface conditions. The 8x8 concept vehicles with 16.00 R20XS tires (MC11 and MC12) had the highest mobility rating speeds of the study vehicles during the sand surface condition.

89. The higher mobility rating speeds of the 8x8 concept vehicles (MC9-MC12) were largely due to their better suspension systems during the dry and wet-wet slippery surface conditions.

Study vehicles

90. The mobility rating speed for the concept vehicles (MC3, MC7, and MC11) and the comparison vehicles at the tactical standard mobility level are given in Table 14.

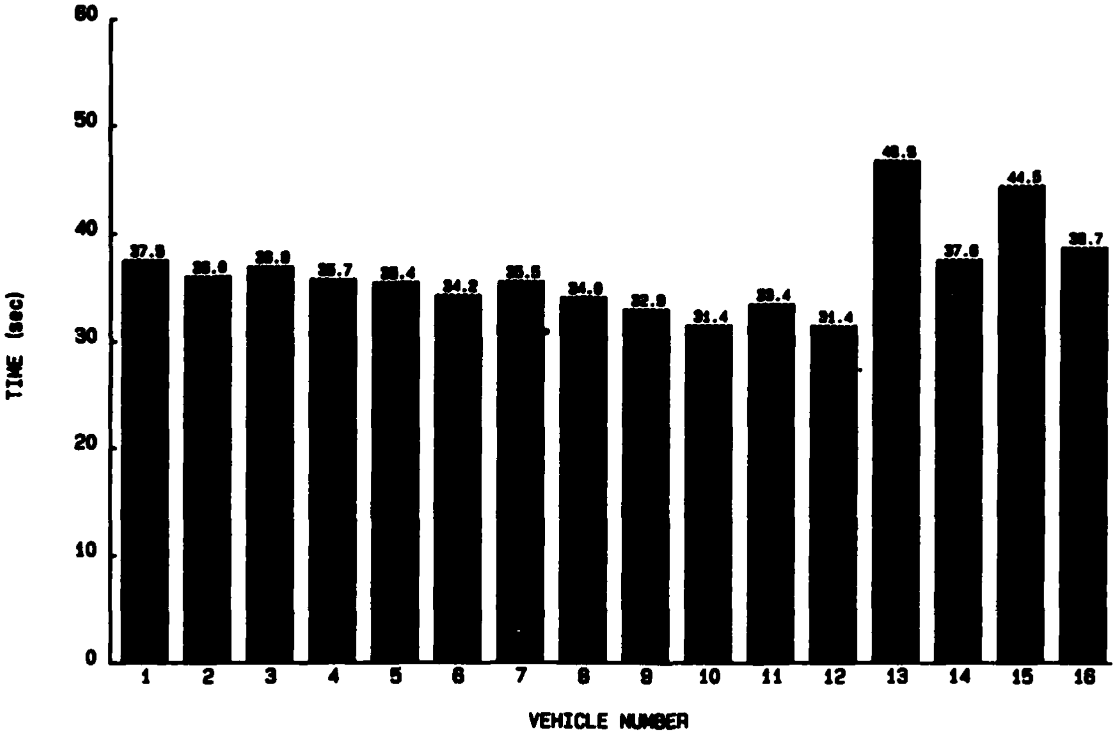
91. The MC11 had the highest mobility rating speed at the tactical standard mobility level of the study vehicles during the dry surface condition. The MC11 and M1 had the higher mobility rating speeds at the tactical standard mobility level of the study vehicles during the wet-wet slippery surface condition. The M1 had the highest mobility rating speed of the study vehicles at the tactical standard mobility level during the sand surface condition. All of the tracked study vehicles had much higher mobility rating speeds at the tactical standard mobility level during the sand condition than the wheeled study vehicles.

Dash Mobility

92. The dash mobility performance in terms of average speed and average time to complete 500-m dashes in each dash-maneuver terrain unit of the dash-maneuver areas in the Mafraq quad are given in Table 10. The times to complete the 500-m dashes are also shown graphically in Figures 13 and 14. The concept vehicles are compared on the time to complete a 500-m dash.

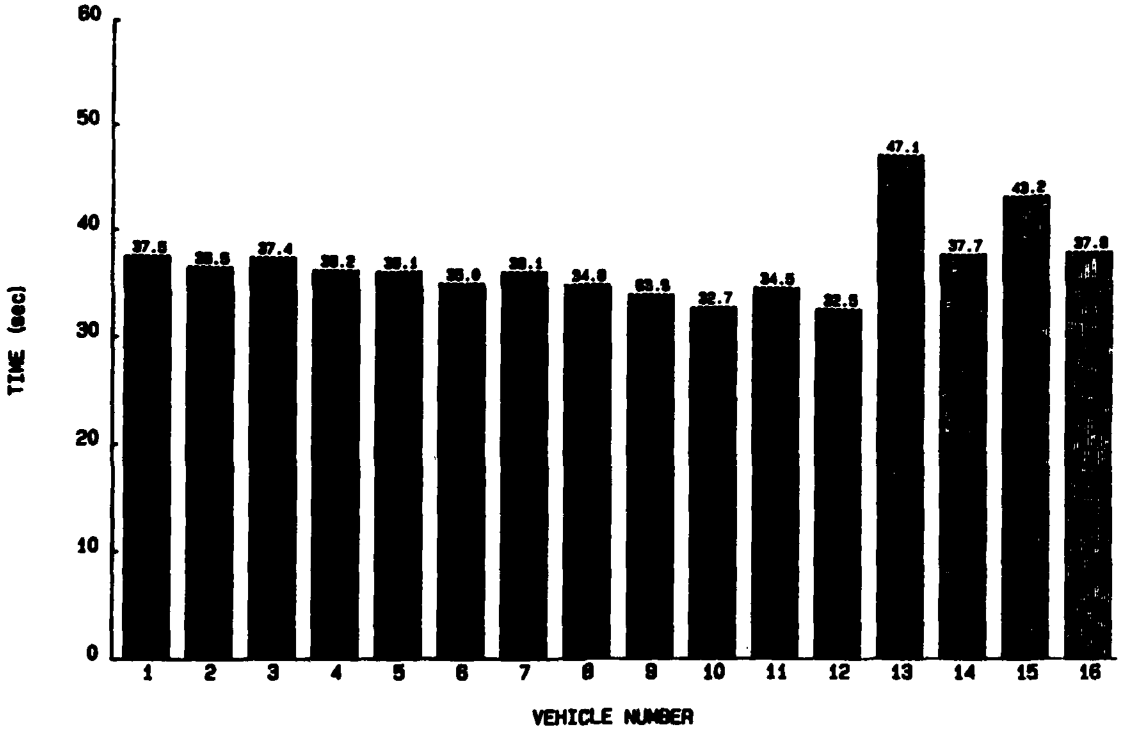
93. The 8x8 concept vehicle equipped with 655-hp engine and 16.00 R20XS tires (MC12) had the lowest dash time of the concept vehicles. The 6x6 concept vehicles and 4x4 concept vehicles equipped with the 655-hp engine and 16.00 R20XS tires had the lowest dash times for the 6x6 concept vehicles and 4x4 concept vehicles, respectively.

94. All of the concept vehicles had lower dash times than the comparison vehicles. This is attributed to their higher horsepower-ton ratio and good suspension systems.



LEGEND			
1	MC1	9	MC9
2	MC2	10	MC10
3	MC3	11	MC11
4	MC4	12	MC12
5	MC5	13	ACVT Concept 5
6	MC6	14	ACVT Concept 3
7	MC7	15	M2
8	MC8	16	M1

Figure 13. Dash time (sec) for study vehicles, HIMO areas, Mid-East, dry condition



LEGEND

1	MC1	9	MC9
2	MC2	10	MC10
3	MC3	11	MC11
4	MC4	12	MC12
5	MC5	13	ACVT Concept 5
6	MC6	14	ACVT Concept 3
7	MC7	15	M2
8	MC8	16	M1

Figure 14. Dash time (sec) for study vehicles, HIMO areas, Mid-East, wet-wet slippery condition

Utility Curves

V_{80} Mid-East

95. The Marine Corps provided the V_{80} utility curve shown in Figure 15 and asked WES to compare the vehicles based on this curve. The curve represents the utility given to various V_{80} speeds in the Mid-East during wet-wet slippery surface conditions. In the Mid-East study area (Mafraq quad), all concept vehicles rated more than 80 on the V_{80} utility curve (Figure 15). Increased horsepower and larger tires have almost no effect on the utility of the concept vehicles. All 4x4 vehicles had a utility of 82 percent; all 6x6 concept vehicles had a utility of 90 percent, while all 8x8 vehicles had a utility greater than 100 percent.

96. The ACVT Concept 5 vehicle had a V_{80} utility of 54 percent, which was the lowest of the study vehicles. The M1 and M2 had a utility of 81 percent and 84 percent, respectively, while the ACVT Concept 3 had the highest utility, which was greater than 100 percent.

Percent NOGO Mid-East

97. The cross-country percent NOGO curve represents the percent of terrain that a vehicle cannot negotiate. The Mid-East curve has the same basic shape as the percent NOGO utility used in the Federal Republic of Germany. WES set a utility value of 100 at 0 percent NOGO and 0 utility was set at 20 percent NOGO (Figure 16). In the Mid-East study area the MC3 (4x4 concept vehicle) had the lowest percent NOGO and rated a utility of 85 percent on the utility curve (Figure 16). The best 6x6 and 8x8 concept vehicles had a utility slightly less than the 4x4 vehicle. All of the NOGO's in the Mid-East study area were caused by obstacles (Table B26). The ACVT Concept 5 rated 70 percent on the utility curve. All of the tracked comparison vehicles had a utility above 95 percent.

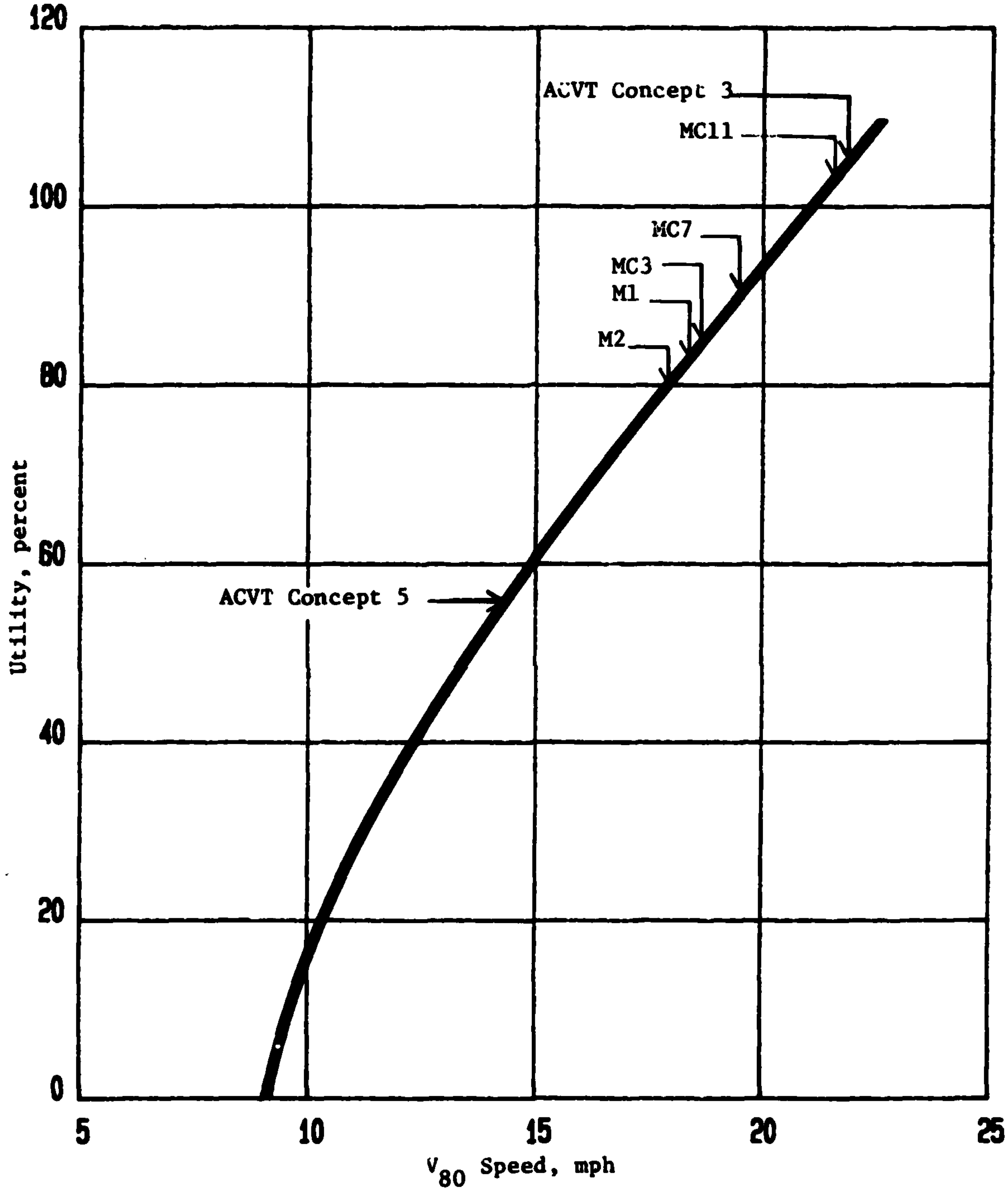


Figure 15. Cross-country V_{80} speed versus utility, H1MO area, Mid-East, wet-wet slippery condition

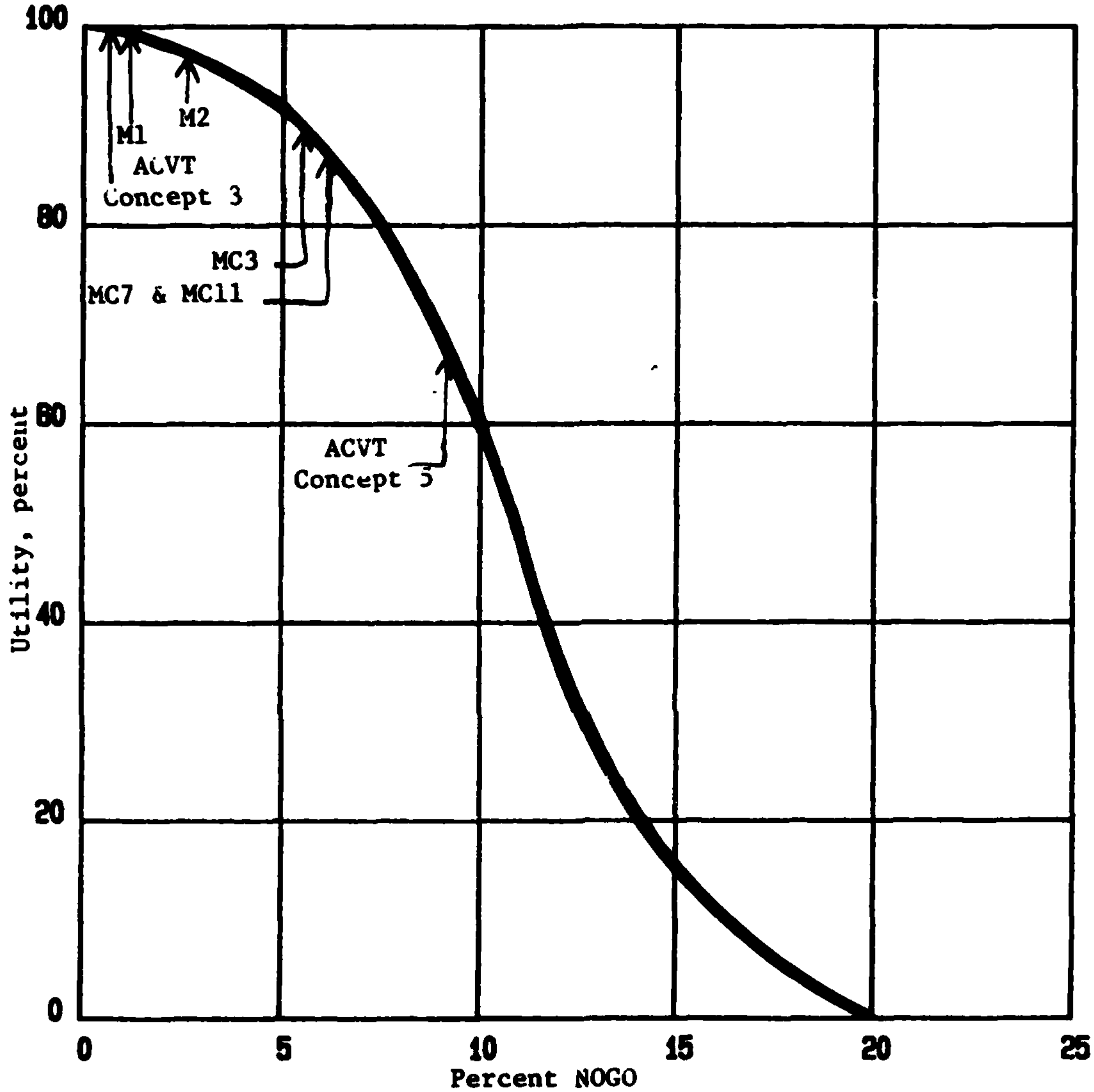


Figure 16. Cross-country percent NOGO versus utility, HIMO area, Mid-East, wet-wet slippery condition

PART VI: SUMMARY ASSESSMENT

98. The effects on mobility of concept variation and the overall mobility of study vehicles are summarized in this part.

Effects on Mobility of Concept Vehicle Variation

99. Engine size, tires, and number of axles were varied in this study. The effects on mobility of these variations are summarized as follows:

a. Engine. The concept vehicles equipped with the 655-hp engine did not show a significant increase in overall mobility over the concept vehicles equipped with the 435-hp engine. The most significant mobility increase of the larger engine was in reducing the dash times (Table 10 and Figures 9, 10, 13, and 14).

b. Tires. The 4x4 concept vehicles with 16.00 R20XS tires showed a large decrease in percent NOGO over the vehicles equipped with 14.00 R20XS tires during the wet-wet slippery condition in the Federal Republic of Germany and the sand condition in the Mid-East. The 6x6 and 8x8 concept vehicles equipped with 16.00 R20XS tires showed significant decreases in percent NOGO over the 6x6 and 8x8 concept vehicles equipped with 14.00 R20XS tires during the sand condition of the Mid-East (Table 6).

c. Axles. The 8x8 concept vehicles showed significant increases in off-road V_{80} speed and V_{100} speed on trails over the 6x6 vehicles for all surface conditions in the Mid-East due to better ride dynamic relations of the 8x8 concept vehicles. The 6x6 concept vehicle also showed a slight increase in off-road V_{80} speed and V_{100} speed on trails over the 4x4 concept vehicles for all surface conditions in the Mid-East due to better ride dynamic relations of 6x6 configurations (Table 6).

Comparison of Mobility of Concept Vehicles and Comparison Vehicles

100. The off-road and on-road mobility, tactical standard mobility level, dash performance, and utility of the concept vehicles are summarized as follows:

Off-road mobility

101. The V_{80} speeds of the concept vehicles were slightly less than those of the ACVT Concept 3 but better than those of the M1 and M2 for the dry and wet-wet slippery surface condition of study areas in the Federal Republic of Germany. The V_{80} speeds of some of the concept vehicles were slightly lower than for the ACVT Concept 3 and similar to the M1 and M2 for the snow condition in the study areas in the Federal Republic of Germany (Table 7). The V_{80} speed of the best concept vehicle is slightly higher than that for any of the comparison vehicles during the dry condition of the Mid-East study area and is only slightly lower than the ACVT Concept 3 during the wet-wet slippery and sand condition of the Mid-East study area (Table 12).

102. Percent NOGO for the concept vehicles is always significantly greater (worse) than for the ACVT Concept 3, M1, and M2 tracked vehicles (Tables 7 and 12).

On-road mobility

103. The V_{100} speeds on primary and secondary roads and trails for the best concept vehicles equal or exceed the ACVT Concept 3, M1, and M2 tracked vehicles for the dry, wet-wet slippery, and snow surface conditions in the study area in the Federal Republic of Germany (Table 7) and the dry and wet-wet slippery surface conditions in the Mid-East study area (Table 12). The ACVT Concept 3, M1, and M2 tracked vehicles greatly exceeded the V_{100} speeds of all of the concept vehicles on trails in the sand condition.

Tactical standard mobility

104. The mobility rating speeds for the concept vehicles at the tactical standard mobility level during dry, wet-wet slippery, and snow conditions in the Federal Republic of Germany were only slightly lower than those of the ACVT Concept 3 vehicle, M1 and M2 tracked vehicles and were significantly higher than the ACVT Concept 5 wheeled vehicle (Table 9).

105. The mobility rating speeds for some of the concept vehicles were slightly higher than those of the M1 during the dry and wet-wet slippery surface condition of the Mid-East Mafraq quad. All of the

concept vehicles had much lower mobility rating speeds than the ACVT Concept 3, M1, and M2 tracked vehicles for the sand condition of the Mid-East (Table 14).

Dash mobility performance

106. All of the concept vehicles (MC1-MC12) had smaller (better) times for completing the 500-m dash in the dash-maneuver areas than the ACVT Concept 3, M1, and M2 tracked vehicle and the ACVT Concept 5 wheeled vehicle for both the dry and wet-wet slippery surface conditions in the Federal Republic of Germany and the Mid-East study areas (Table 11).

Utility, V_{80}

107. The 4x4 concept vehicles did not rate on the utility curve for the Federal Republic of Germany, and the 6x6 and 8x8 concept vehicles rated between 37 and 41 percent on the V_{80} utility curve in the Federal Republic of Germany. All of the tracked study vehicles (ACVT Concept 3, M1, and M2) had a utility of 58 percent or above on the V_{80} utility curve for the Federal Republic of Germany (Figure 11). All of the concept vehicles rated greater than 90 percent on the V_{80} utility curve for the Mid-East (Figure 15).

Utility, Percent NOGO

108. The 4x4 concept vehicle did not rate on the utility curve and the 6x6 and 8x8 concept vehicles rated between 15 and 20 percent. All of the tracked vehicles (ACVT Concept 3, M1, and M2) rated 90 percent or more on the percent NOGO utility curve for the Federal Republic of Germany (Figure 12). All of the concept vehicles rated over 80 percent on the percent NOGO utility curve for the Mid-East study area (Figure 16). The tracked vehicles (ACVT Concept 3, M1, and M2) rated over 95 percent on the percent NOGO utility curve for the Mid-East study area.

Wheeled Vehicles versus Tracked Vehicles

109. Wheeled vehicles can be designed to compare with or exceed the V_{80} speeds of some of the best curre. tracked vehicles. This

includes all surface conditions evaluated* in the Federal Republic of Germany and Mid-East study areas (Tables 7 and 12). However, wheeled vehicles have a significantly higher percent NOGO** in the study areas than tracked vehicles under all surface conditions in both study areas (Tables 7 and 12).

* Only shallow snow (10 in. depth) performance was evaluated in this study. Wheeled vehicles (with tire sizes used in this study) have almost no mobility in deeper snow (18 in. depth or greater), whereas most tracked vehicles would have little difficulty in the deeper snow.

** Although wet gap-crossing performance of the wheeled concept vehicles was not compared directly with the tracked comparison vehicles, the WACROSS study (Nuttall 1979) showed that tracked vehicles have decidedly superior crossing performance in crossing small gaps.

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* Classified reference. Bibliographic material for the classified reference will be furnished to qualified agencies upon request.

Table 1

Description of Some Important Characteristics for Concept Vehicles

Concept No.	Axles	Tires	Horsepower	Suspension*	Weight, tons**	Hull Description
MC1	4x4	14.00 R20XS	435	Independent	Less than 16	ACVT Concept
MC2	4x4	14.00 R20XS	655	Independent	Less than 16	ACVT Concept
MC3	4x4	16.00 R20XS	435	Independent	Less than 16	ACVT Concept
MC4	4x4	16.00 R20XS	655	Independent	Less than 16	ACVT Concept
MC5	6x6	14.00 R20XS	435	Independent	Less than 16	ACVT Concept
MC6	6x6	14.00 R20XS	655	Independent	Less than 16	ACVT Concept
MC7	6x6	16.00 R20XS	435	Independent	Less than 16	ACVT Concept
MC8	6x6	16.00 R20XS	655	Independent	Less than 16	ACVT Concept
MC9	8x8	14.00 R20XS	435	Independent	Less than 16	ACVT Concept
MC10	8x8	14.00 R20XS	655	Independent	Less than 16	ACVT Concept
MC11	8x8	16.00 R20XS	435	Independent	Less than 16	ACVT Concept
MC12	8x8	16.00 R20XS	655	Independent	16	ACVT Concept

* Independent suspension would be used on all wheels, each with spring and damping rates and wheel travels adjusted to optimize ride and shock performance for each tire size and number (and location) of axles.

** Concept 12 would weigh 16 tons with all other concepts slightly lighter.

Table 2

Important Characteristics of Study Vehicles

Vehicle	Tires	Gross Vehicle Weight, lb	Wheel-base in.	Engine	Power-to-Weight Ratio hp/ton	Minimum Ground Clearance, in.	Approach Angle deg	Departure Angle deg	Transmission	VCI, Fine-Grained Soil	Maximum Speed mph	Speeds for Obstacle Heights at 2.5 g, mph			6-Watt Speeds For Indicated rms Elevation, mph		
												4	6	10	1	2	3
MC1 (4x4)	14.00 R20XS*	26,280	156	8V92TA Detroit Diesel	32.9	15.0	55	48	HT-750 Allison	34.2	55	55	55	15.6	25.5	17.0	15.2
MC2 (4x4)	14.00 R20XS	28,058	156	12V71TA Detroit Diesel	46.7	15.0	55	48	CLBT-6061 Allison	37.3	55	55	55	15.6	25.5	17.0	15.2
MC3 (4x4)	16.00 R20XS	26,684	156	8V92TA Detroit Diesel	32.4	16.3	56	49	HT-750 Allison	29.3	55	55	55	15.6	25.5	17.0	15.2
MC4 (4x4)	16.00 R20XS	28,442	156	12V71TA Detroit Diesel	46.0	16.3	56	49	CLBT-6061 Allison	32.0	55	55	55	15.6	25.5	17.0	15.2
MC5 (6x6)	14.00 R20XS	27,450	174	8V92TA Detroit Diesel	31.5	15.0	67	65	HT-750 Allison	25.6	55	55	55	12.5	27.2	19.5	17.0
MC6 (6x6)	14.00 R20XS	29,220	174	12V71TA Detroit Diesel	44.8	15.0	67	65	CLBT-6061 Allison	26.8	55	55	55	12.5	27.2	19.5	17.0
MC7 (6x6)	16.00 R20XS	27,984	174	8V92TA Detroit Diesel	30.9	16.3	68	66	HT-750 Allison	22.4	55	55	55	12.5	27.2	19.5	17.0
MC8 (6x6)	16.00 R20XS	29,859	174	12V71TA Detroit Diesel	43.9	16.3	68	66	CLBT-6061 Allison	23.5	55	55	55	12.5	27.2	19.5	17.0
MC9 (8x8)	14.00 R20XS	28,340	180	8V92TA Detroit Diesel	30.5	15.0	70	62	HT-750 Allison	21.6	55	55	55	14.1	35.5	22.5	18.2
MC10 (8x8)	14.00 R20XS	30,128	180	12V71TA Detroit Diesel	43.5	15.0	70	62	CLBT-6061 Allison	22.4	55	55	55	14.1	35.5	22.5	18.2
MC11 (8x8)	16.00 R20XS	30,212	180	8V71TA Detroit Diesel	28.6	16.3	71	63	HT-750 Allison	19.7	55	55	55	14.1	35.5	22.5	18.2
MC12 (8x8)	16.00 R20XS	32,000	180	12V71TA Detroit Diesel	40.9	16.3	71	63	CLBT-6061 Allison	20.4	55	55	55	14.1	35.5	22.5	18.2

* Michelin sand tire.

Table 3

Important Characteristics of Comparison Vehicles

Vehicle	Vehicle Type	Gross Vehicle Weight lb	Tire Size or Track Length on Ground	Track Width or Nominal Tire Width in.	Power-to-Weight Ratio hp/ton	Minimum Ground Clearance in.	Approach Angle deg	Departure Angle deg	VCI_1 Fine-Grained Soil	Maximum Speed mph	Speeds for Obstacle Height at 2.5 g 6-in.	8-in.	12-in.	6-Watt Speeds for Indicated rms Elevation, mph 1.0	1.5	2.0
ACVT Concept 5	Wheeled	32,000	14.00 X20	14.0	23.4	15.0	71	90	32.5	50	50.0	17.7	8.3	20.0	14.0	12.0
ACVT Concept 3	Tracked	32,000	138	15.0	23.4	19.0	90	90	17.0	50	50.0	50.0	50.0	45.0	25.0	17.0
M2	Tracked	47,000	157	21.0	21.3	17.5	90	50	13.1	41	55.0	55.0	55.0	55.0	20.0	14.2
M1	Tracked	115,000	184	25.0	26.1	19.0	58	38	23.4	46	55.0	55.0	55.0	55.0	31.0	21.0

Table 4

Preliminary Quantification of WHEELS Study Definitions of Tactical Mobility*

Mobility Level	Operating Distance: Off-Road Percent	Operating Distance: On-Road* Percent	Severity of Operation: Off-Road** Percent of Terrain Challenged	Severity of Operation: On-Road Percent of Trails Challenged
High-high mobility†				
All off-road operations	100	0	100	--
Tactical high mobility				
The highest level of mobility designating the requirements for extensive cross-country maneuverability characteristics of operations in the ground-gaining and fire-support environment	50	50	90	100
Tactical standard mobility				
The second highest level of mobility designating the requirement for occasional cross-country movement	15	85	80	100
Tactical support mobility				
A level of mobility designating the requirement for infrequent off-road operations over selected terrain with the preponderance of movement on primary and secondary roads	5	95	50	50
On-road mobility†				
All on superhighways, primary and secondary roads, and the best tertiary roads and trails	0	100	--	10

* From U. S. Army Engineer Waterways Experiment Station and U. S. Army Tank-Automotive Command (1972).

** In terms of percentage of best off-road terrain to be challenged (off-road speed profile).

† Not a WHEELS Study definition, but added during HIMO Study to yield a continuum from all off-road to all on-road.

Table 5

Network Composition and Severity at Tactical Mobility Levels for the Federal Republic of Germany and Mid-East Study Areas

	Composition of Network in Percent				Severity of Operation in Terms of Percent of Terrain and Roads Challenged*			
Mobility Levels	Primary Roads P_P	Secondary Roads P_S	Trails P_T	Off-Road P	Primary Roads V_{PP}	Secondary Roads V_{SP}	Trails V_{TP}	Off-Road V_C
Federal Republic of Germany								
High-High	0	0	0	100	--	--	--	V_{100}
Tactical High	10	30	10	50	V_{100}	V_{100}	V_{100}	V_{90}
Tactical Standard	20	50	15	15	V_{100}	V_{100}	V_{100}	V_{80}
Tactical Support	30	55	10	5	V_{100}	V_{100}	V_{50}	V_{50}
On-Road	35	60	5	0	V_{100}	V_{100}	V_{10}	--
Mid-East								
High-high	0	0	0	100	--	--	--	V_{100}
Tactical High	5	20	25	50	V_{100}	V_{100}	V_{100}	V_{90}
Tactical Standard	15	35	35	15	V_{100}	V_{100}	V_{100}	V_{80}
Tactical Support	20	40	35	5	V_{100}	V_{100}	V_{80}	V_{50}
On-Road	30	40	30	0	V_{100}	V_{100}	V_{50}	--

* Percent of terrain challenged refers to the average speed of the vehicle over a given percent of the best terrain. For instance, V_{90} means that speed of the vehicle negotiating 90 percent of the terrain with the higher speeds and avoiding the 10 percent of the terrain with the lowest speeds.

Table 6

Selected Mobility Rating Speed (mph) and Percent NOGO for the Federal Republic of Germany and the HIMO Mid-East Study Areas

	Dry Normal Condition							Wet-Wet Slippery Condition							Snow Condition*						
	Off-Road Speed, mph				On-Road Speed, mph			Off-Road Speed, mph				On-Road Speed, mph			Off-Road Speed, mph				On-Road Speed, mph		
					Primary	Secondary	Trails					Primary	Secondary	Trails					Primary	Secondary	Trails
Vehicle	V_{50}	V_{80}	V_{90}	NOGO	V_{100}	V_{100}	V_{100}	V_{50}	V_{80}	V_{90}	NOGO	V_{100}	V_{100}	V_{100}	V_{50}	V_{80}	V_{90}	NOGO	V_{100}	V_{100}	V_{100}
MC1	24.9	19.0	15.3	9.4	32.6	29.7	16.0	14.6	0.5	0.3	36.0	30.3	27.4	15.7	19.5	4.4	0.8	21.2	24.7	20.4	15.7
MC2	25.3	19.5	16.6	9.5	32.9	30.4	16.0	2.1	0.2	0.2	51.8	30.6	28.0	4.7	20.7	4.5	0.8	21.2	27.7	21.4	15.9
MC3	24.9	19.0	16.2	9.1	32.6	29.6	16.0	16.6	3.9	0.7	21.3	30.3	27.3	15.9	19.5	4.9	0.8	21.0	24.9	20.4	15.7
MC4	25.3	19.5	16.7	9.1	33.0	30.4	16.0	16.8	0.8	0.5	28.7	30.6	28.0	16.0	20.7	5.1	0.8	21.0	27.7	21.4	15.9
MC5	25.5	18.5	15.3	9.2	32.6	29.5	17.3	17.4	12.6	0.9	19.2	30.2	27.3	17.2	20.3	13.6	0.9	19.6	27.4	21.1	17.1
MC6	26.1	19.1	16.0	9.2	32.9	30.4	17.3	18.2	12.7	0.9	19.7	30.5	27.9	17.3	21.1	14.2	0.9	19.6	28.0	21.7	17.3
MC7	25.5	18.5	15.4	8.7	32.4	29.4	17.3	17.9	13.3	1.1	17.5	30.1	27.2	17.2	20.2	13.8	0.9	19.2	27.0	21.7	17.1
MC8	26.0	19.0	16.0	8.7	33.0	30.3	17.3	18.6	13.9	1.1	17.7	30.6	27.9	17.3	21.1	14.4	0.9	20.4	28.0	21.7	17.3
MC9	27.1	19.2	15.1	9.6	32.5	29.4	19.0	18.3	13.4	1.0	17.9	30.2	27.2	18.8	21.3	14.4	0.9	19.2	27.8	21.3	18.8
MC10	27.9	19.9	15.8	9.6	32.9	30.3	19.0	19.1	14.1	1.0	18.2	30.5	27.9	19.0	22.0	14.8	0.9	19.2	28.2	21.7	19.0
MC11	26.9	19.1	15.6	8.7	32.3	29.1	19.0	18.3	13.5	1.1	17.1	30.0	27.0	18.7	21.1	14.2	1.0	18.3	27.6	21.2	18.7
MC12	27.7	19.7	16.1	8.7	32.9	30.2	19.0	19.2	14.2	1.2	17.1	30.5	27.8	19.0	22.0	14.8	1.0	18.3	28.1	21.7	19.0
MC1	23.1	19.5	18.1	6.7	36.1	30.3	18.3	22.7	18.3	16.4	8.0	33.9	27.8	18.2	15.6	2.2	0.7	23.0	33.0	27.8	0.7
MC2	23.1	19.6	18.1	6.7	36.2	30.4	18.3	22.8	18.3	16.4	8.4	33.9	27.8	18.3	15.4	1.1	0.5	26.5	33.0	27.8	0.6
MC3	23.1	19.5	18.1	5.5	36.1	30.3	18.3	22.8	18.4	16.7	6.3	33.8	27.8	18.2	16.7	14.1	1.7	14.5	32.9	27.8	0.8
MC4	23.1	19.6	18.1	5.5	36.2	30.4	18.3	22.9	18.5	16.7	6.3	33.9	27.8	18.3	16.5	14.2	1.6	15.0	33.0	27.8	0.8
MC5	25.0	20.9	18.6	7.1	36.1	27.8	20.1	24.8	19.6	16.9	7.9	33.8	27.8	19.9	16.6	13.3	1.1	17.3	32.9	27.8	0.8
MC6	25.1	21.0	18.6	7.1	36.2	30.4	20.1	25.0	19.7	17.0	7.8	33.9	27.8	20.1	16.7	13.3	1.0	18.7	33.0	27.8	0.8
MC7	25.0	20.9	18.7	6.1	35.9	30.3	20.1	24.9	19.6	17.0	6.8	33.6	27.8	19.8	17.4	14.5	2.3	13.2	32.8	27.8	0.9
MC8	25.1	21.0	18.7	6.1	36.2	30.4	20.1	25.0	19.7	17.0	6.8	33.9	27.9	20.1	17.6	14.7	2.2	13.5	33.0	27.8	0.9
MC9	29.5	23.6	20.3	7.2	36.1	30.3	22.6	29.1	21.6	18.0	8.0	33.8	27.8	22.2	17.8	14.4	1.5	15.5	32.9	27.8	0.8
MC10	29.7	23.7	20.4	7.2	36.2	30.4	22.8	29.4	21.8	20.4	8.0	33.9	27.8	22.6	18.1	14.5	1.3	16.0	33.0	27.8	0.8
MC11	29.4	23.6	20.4	6.1	35.8	30.2	22.6	29.0	21.6	18.1	6.8	33.5	27.7	22.1	18.3	15.0	3.1	12.2	32.7	27.7	1.2
MC12	29.7	23.7	20.5	6.1	36.2	30.4	22.8	29.4	21.8	18.3	6.8	33.9	27.8	22.6	18.9	15.4	3.5	11.9	33.0	27.8	1.2

* Condition changes to sand in Mid-East.

Table 7

Mobility Performance Data (mph) for Selected Study Vehicles in the Federal Republic of Germany Study Areas

Vehicles	V_{50}	V_{80}	V_{90}	NOGO percent	Primary V_{100}	Secondary V_{100}	Trails V_{100}
				Dry Normal Condition			
MC3	24.9	19.0	16.2	9.1	32.6	29.6	16.0
MC7	25.5	18.5	15.4	8.7	32.4	29.4	17.3
MC11	26.9	19.1	15.6	8.7	32.3	29.1	19.0
ACVT Concept 5	20.9	15.2	12.3	7.8	30.3	26.8	12.5
ACVT Concept 3	27.0	19.8	17.2	3.3	29.7	27.2	16.1
M2	23.5	16.5	13.7	4.3	28.4	26.0	14.1
M1	23.7	15.9	12.6	5.1	30.3	27.8	18.3
				Wet-Wet Slippery Condition			
MC3	16.6	3.9	0.7	21.3	30.3	27.3	15.9
MC7	17.9	13.3	1.1	17.5	30.1	27.2	17.2
MC11	18.3	13.5	1.1	17.1	30.0	27.0	18.7
ACVT Concept 5	11.3	7.4	0.9	19.0	28.4	25.5	12.1
ACVT Concept 3	18.1	14.7	12.2	8.3	27.8	25.4	15.7
M2	17.5	13.2	8.7	9.9	26.7	24.8	13.9
M1	17.2	12.1	7.0	10.2	28.3	26.3	17.9
				Snow Condition			
MC3	19.5	4.9	0.8	21.0	24.9	20.4	15.7
MC7	20.2	13.8	0.9	19.2	27.0	21.7	17.1
MC11	21.1	14.2	1.0	18.3	27.6	21.2	18.7
ACVT Concept 5	16.9	9.5	0.8	19.9	25.5	19.8	12.4
ACVT Concept 3	24.1	17.3	3.1	12.3	27.1	21.6	16.4
M2	22.4	14.7	1.7	14.5	26.1	21.5	14.4
M1	22.7	13.5	1.9	13.7	27.7	21.7	18.7

Table 8

Mobility Rating Speed (mph) of Concept Vehicles at Tactical Mobility Levels in the Federal Republic of Germany (Lauterbach Quad)

Vehicle	On-Road	Tactical Support	Tactical Standard	Tactical High	High-High
			Dry Normal Condition		
MC1	30.7	25.4	18.1	9.8	0.9
MC2	31.3	25.8	18.3	10.0	0.9
MC3	30.7	25.4	18.1	9.9	0.9
MC4	31.3	25.8	18.3	10.1	0.9
MC5	30.7	25.6	18.2	9.8	0.9
MC6	31.4	26.1	18.5	10.0	0.9
MC7	30.6	25.6	18.2	9.8	1.0
MC8	31.4	26.1	18.4	10.0	1.0
MC9	30.9	26.3	18.9	10.1	0.9
MC10	31.6	26.6	18.8	10.0	0.9
MC11	30.6	25.9	18.4	9.9	1.0
MC12	31.5	26.8	19.1	10.4	1.0
			Wet-Wet Slippery Condition		
MC1	28.5	23.1	2.9	0.6	0.3
MC2	29.0	15.8	1.2	0.4	0.2
MC3	28.4	23.3	11.3	1.3	0.5
MC4	29.0	23.6	4.2	0.9	0.3
MC5	28.5	23.6	16.3	1.6	0.5
MC6	29.0	23.9	16.4	1.6	0.5
MC7	28.4	23.5	16.4	1.9	0.5
MC8	29.1	24.0	16.7	1.9	0.5
MC9	28.6	24.0	16.6	1.7	0.5
MC10	29.2	24.4	16.9	1.7	0.5
MC11	28.4	23.8	16.6	1.9	0.6
MC12	29.2	24.4	17.0	2.0	0.6
			Snow Condition		
MC1	22.0	19.4	10.9	1.4	0.5
MC2	23.6	20.6	11.3	1.4	0.5
MC3	22.1	19.5	11.4	1.4	0.5
MC4	23.6	20.6	11.8	1.4	0.5
MC5	23.4	20.5	15.2	1.6	0.5
MC6	24.0	21.0	15.5	1.6	0.5
MC7	23.3	20.4	15.2	1.6	0.5
MC8	24.0	21.0	15.5	1.6	0.5
MC9	23.8	21.0	15.6	1.6	0.5
MC10	24.2	21.4	15.8	1.6	0.5
MC11	23.6	20.9	15.5	1.7	0.5
MC12	24.2	21.5	16.1	1.8	0.5

Table 9

Mobility Rating Speed (mph) of Selected Study Vehicles at Tactical Mobility Levels in the Federal Republic of Germany (Lauterbach Quad)

Vehicle	On-Road	Tactical Support	Tactical Standard	Tactical High	High-High
		Dry Normal Condition			
MC3	30.7	25.4	18.1	9.9	0.9
MC7	30.6	25.6	18.2	9.8	1.0
MC11	30.6	25.9	18.4	9.9	1.0
ACVT Concept 5	28.5	26.3	15.0	7.8	1.0
ACVT Concept 3	28.0	22.1	20.9	14.5	2.2
M2	27.2	24.7	19.2	12.7	1.8
M1	29.1	27.1	21.2	13.2	1.6
		Wet-Wet Slippery Condition			
MC3	28.4	23.3	11.3	1.3	0.5
MC7	28.4	23.5	16.4	1.9	0.5
MC11	28.4	23.8	16.6	1.9	0.6
ACVT Concept 5	26.4	20.1	12.5	1.5	0.5
ACVT Concept 3	26.9	24.2	18.7	11.6	1.0
M2	25.7	23.2	17.9	9.9	0.9
M1	27.3	25.0	19.0	9.0	0.9
		Snow Condition			
MC3	22.1	19.5	11.4	1.4	0.5
MC7	23.3	20.4	15.2	1.6	0.5
MC11	23.6	20.9	15.5	1.7	0.5
ACVT Concept 5	21.8	18.2	12.4	1.4	0.5
ACVT Concept 3	23.9	22.4	18.2	4.8	0.8
M2	23.5	21.9	17.3	2.9	0.6
M1	24.2	22.9	18.0	3.4	0.7

Table 10

Average Speed and Average Time for MC Concept Vehicles and Comparison Vehicles to Complete 500-m Dash in Maneuver Terrain Units

Vehicle	Speed, mph	Time, sec
	Federal Republic of Germany Dry Normal Condition	
MC1	31.6	35.4
MC2	32.9	34.0
MC3	31.7	35.3
MC4	33.4	33.5
MC5	32.4	34.5
MC6	34.2	32.6
MC7	32.4	34.5
MC8	34.4	32.6
MC9	34.0	32.9
MC10	36.2	30.9
MC11	33.4	33.5
MC12	36.1	31.0
ACVT Concept 5	24.6	45.4
ACVT Concept 3	29.3	38.2
M2	25.2	44.4
M1	28.7	39.0
	Federal Republic of Germany Wet-Wet Slippery Condition	
MC1	28.3	39.5
MC2	29.8	37.5
MC3	28.6	39.1
MC4	30.4	36.8
MC5	29.6	37.8
MC6	31.4	35.7
MC7	29.6	37.8
MC8	31.6	35.4
MC9	31.1	36.0
MC10	33.3	33.6
MC11	30.6	36.6
MC12	33.2	33.7
ACVT Concept 5	21.2	52.9
ACVT Concept 3	27.0	41.4
M2	23.8	47.0
M2	26.3	42.5

(Continued)

Table 10 (Concluded)

Vehicle	Speed, mph	Time, sec
Mid-East - Dry Normal Condition		
MC1	29.8	37.5
MC2	31.1	36.0
MC3	30.3	36.9
MC4	31.3	35.7
MC5	31.6	35.4
MC6	32.7	34.2
MC7	31.5	35.5
MC8	32.9	34.0
MC9	34.0	32.9
MC10	35.6	31.4
MC11	33.5	33.4
MC12	35.6	31.4
ACVT Concept 5	23.8	46.9
ACVT Concept 3	29.8	37.6
M2	25.2	44.5
M1	28.9	38.7
Mid-East - Wet-Wet Slippery Condition		
MC1	29.8	37.5
MC2	30.6	36.5
MC3	29.9	31.4
MC4	30.9	36.2
MC5	31.0	36.1
MC6	32.0	35.0
MC7	31.0	36.1
MC8	32.2	34.8
MC9	33.0	33.9
MC10	34.2	32.7
MC11	32.4	34.5
MC12	34.4	32.5
ACVT Concept 5	23.8	47.1
ACVT Concept 3	29.7	37.7
M2	25.9	43.2
M1	29.5	37.9

Table 11

Average Speed and Average Time for MC Concept Vehicles and Comparison Vehicles to Complete 500-m Dash in Maneuver Terrain Units

Vehicle	Speed, mph	Time, sec
	Federal Republic of Germany Dry Normal Condition	
MC3	31.7	35.3
MC7	32.4	34.5
MC11	33.4	33.5
ACVT Concept 5	24.6	45.4
ACVT Concept 3	29.3	38.2
M2	25.2	44.4
M1	28.7	39.0
	Federal Republic of Germany Wet-Wet Slippery Condition	
MC3	28.6	39.1
MC7	29.7	37.8
MC11	30.6	36.6
ACVT Concept 5	21.2	52.9
ACVT Concept 3	27.0	41.4
M2	23.8	47.0
M1	26.3	42.5
	Mid-East - Dry Normal Condition	
MC3	30.3	36.9
MC7	31.5	35.5
MC11	33.5	33.4
ACVT Concept 5	23.8	46.9
ACVT Concept 3	29.8	37.6
M2	25.2	44.5
M1	28.9	38.7
	Mid-East - Wet-Wet Slippery Condition	
MC3	29.9	37.4
MC7	31.0	36.1
MC11	32.4	36.1
ACVT Concept 5	23.8	47.1
ACVT Concept 3	29.7	37.7
M2	25.9	43.2
M1	29.5	37.9

Table 12

Mobility Performance Data (mph) for Selected Study Vehicles at Tactical Mobility Levels in the Mid-East Study Areas

Vehicle	V_{50}	V_{80}	V_{90}	NOGO percent	Primary V_{100}	Secondary V_{100}	Trails V_{100}
			Dry Normal Condition				
MC3	23.1	19.5	18.1	5.5	36.1	30.3	18.3
MC7	25.0	20.9	18.7	6.1	35.9	30.3	20.1
MC11	29.4	23.6	20.4	6.1	35.8	30.2	22.6
ACVT Concept 5	19.0	15.3	13.4	8.3	33.9	29.2	13.8
ACVT Concept 3	29.4	22.3	20.4	0.4	32.1	28.1	18.7
M2	23.4	18.1	16.4	2.0	30.7	27.1	16.3
M1	24.3	17.8	16.0	0.9	33.0	28.6	22.2
			Wet-Wet Slippery Condition				
MC3	22.8	18.4	16.7	6.3	33.8	27.8	18.2
MC7	24.9	19.6	17.0	6.8	33.6	27.8	19.8
MC11	29.0	21.6	18.1	6.8	33.5	27.7	22.1
ACVT Concept 5	17.7	14.2	12.2	9.1	32.0	27.5	13.4
ACVT Concept 3	29.5	21.8	19.9	0.6	30.4	26.5	18.1
M2	23.5	17.9	16.3	2.1	29.1	25.7	15.9
M1	26.0	18.6	16.6	1.1	31.2	26.9	21.4
			Sand Condition				
MC3	16.7	14.1	1.7	14.5	32.9	27.8	0.8
MC7	17.4	14.5	2.3	13.2	32.8	27.8	0.9
MC11	18.3	15.0	3.1	12.2	32.7	27.7	1.2
ACVT Concept 5	14.5	12.1	2.0	13.7	31.2	27.5	1.1
ACVT Concept 3	18.5	15.6	14.5	1.3	29.7	26.5	14.7
M2	16.5	13.8	12.7	2.5	28.4	25.7	13.7
M1	16.7	14.0	14.6	1.1	30.4	26.9	18.4

Table 13

Mobility Rating Speed (mph) of Vehicles at Tactical Mobility Levels in the HIMO Mid-East Study Area (Mafraq Quad)

Vehicle	On-Road	Tactical Support	Tactical Standard	Tactical High	High-High
		Dry Normal Condition			
MC1	32.9	27.0	21.6	16.2	1.4
MC2	33.0	27.0	21.7	16.2	1.4
MC3	32.9	27.0	21.7	16.3	1.5
MC4	33.0	27.1	21.7	16.3	1.5
MC5	33.8	28.0	22.8	16.8	1.3
MC6	34.0	28.1	22.8	16.8	1.3
MC7	33.7	28.0	22.8	16.9	1.4
MC8	34.0	28.1	22.8	17.0	1.4
MC9	35.0	30.2	24.3	18.0	1.3
MC10	35.3	30.5	24.5	18.1	1.3
MC11	34.7	30.1	24.3	18.0	1.4
MC12	35.3	30.4	24.5	18.1	1.4
		Wet-Wet Slippery Condition			
MC1	30.7	25.5	20.4	14.7	1.2
MC2	31.1	25.7	20.4	14.7	1.1
MC3	30.7	25.5	20.5	15.0	1.3
MC4	31.1	25.7	20.6	15.0	1.3
MC5	31.3	26.4	21.4	15.2	1.2
MC6	31.9	26.6	21.5	15.3	1.2
MC7	31.3	26.4	21.4	15.3	1.3
MC8	31.9	26.7	21.6	15.5	1.3
MC9	32.4	28.2	22.6	16.0	1.2
MC10	32.8	28.6	22.8	16.1	1.2
MC11	32.1	28.1	22.7	16.2	1.3
MC12	32.7	28.6	22.9	16.3	1.3
		Sand Condition			
MC1	29.3	24.2	1.7	0.9	0.4
MC2	29.9	24.4	1.4	0.7	0.4
MC3	29.4	24.5	2.1	1.6	0.7
MC4	30.2	24.7	2.1	1.5	0.6
MC5	29.9	25.2	2.1	1.3	0.6
MC6	30.6	25.5	2.1	1.2	0.5
MC7	30.0	25.4	2.4	1.9	0.7
MC8	30.8	25.7	2.4	1.9	0.7
MC9	31.6	26.9	2.1	1.5	0.6
MC10	31.9	27.3	2.1	1.4	0.6
MC11	31.5	26.8	3.1	2.6	0.8
MC12	31.9	27.4	3.1	2.7	0.8

Table 14

Mobility Rating Speeds (mph) of Selected Study Vehicles at Tactical Mobility Levels in the HIMO Mid-East Study Area (Mafraq Quad)

Vehicle	On-Road	Tactical Support	Tactical Standard	Tactical High	High-High
		Dry Normal Condition			
MC3	32.9	27.0	21.7	16.3	1.5
MC7	33.7	28.0	22.8	16.9	1.4
MC11	34.7	30.1	24.3	18.0	1.4
ACVT Concept 5	31.1	23.6	18.0	13.2	1.1
ACVT Concept 3	32.6	28.1	21.9	17.7	8.4
M2	30.9	25.9	19.8	15.4	3.4
M1	33.4	29.7	23.6	18.0	5.8
		Wet-Wet Slippery Condition			
MC3	30.7	25.5	20.5	15.0	1.3
MC7	31.3	26.4	21.4	15.3	1.3
MC11	32.1	28.1	22.7	16.2	1.3
ACVT Concept 5	28.2	22.2	17.2	12.2	1.0
ACVT Concept 3	30.4	26.4	20.7	16.4	7.2
M2	28.7	24.3	18.7	14.2	3.3
M1	30.7	28.0	22.7	17.5	5.2
		Sand Condition			
MC3	29.4	24.5	2.1	1.6	0.7
MC7	30.0	25.4	2.4	1.9	0.7
MC11	31.5	26.8	3.1	2.6	0.8
ACVT Concept 5	27.8	21.4	2.8	2.0	0.7
ACVT Concept 3	28.6	23.9	18.3	14.1	4.5
M2	26.8	22.2	17.1	13.0	2.7
M1	29.3	26.0	20.3	14.8	4.7

APPENDIX A: DATA USED TO CHARACTERIZE STUDY VEHICLES AND A BRIEF DESCRIPTION OF FACTORS USED IN DESCRIBING STUDY AREAS IN THE FEDERAL REPUBLIC OF GERMANY AND THE MID-EAST

Vehicle Characteristics and Performance Data

1. Extensive data are required to characterize a vehicle to predict its performance with the AMM and SWIMCRIT/WACROSS water crossing models. These data for the 12 study vehicles are given in Tables A1-A5. Additional data are required for the VEHDYN module. These data for the three vehicle configurations are given in Table A6.

Terrain Data

2. A detailed description of the procedures used to describe the study areas in the Federal Republic of Germany and the Mid-East used as input to the AMM is given in the HIMO study (Nuttall and Randolph 1976). The terrain and road factors required for the AMC-74X and SWIMCRIT/WACROSS water-crossing prediction models are given in Table A7 to show the content of the data required for these models. The terrain profiles used to established the ride dynamics data are given in Table A8.

Table A1

Vehicle Characteristics Used in the Army Mobility Model (AMM)

NO.	IDENTIFICATION	DIMENSIONS	MC1	MC2	MC3	MC6
1	VEHICLE TYPE (NVEH=0 FOR TRACKED AND 1 FOR WHEELED)	--	1	1	1	1
2	GROSS VEHICLE WEIGHT	LBS	26,280.	28,058.	26,684.	28,462.
3	TRACK TYPE (NFL=0 FOR FLEXIBLE AND 1 FOR GIRDERIZED)	NA	NA	NA	NA	NA
4	GROUSER HEIGHT FOR TRACKS	IN.	NA	NA	NA	NA
5	TIRE PLY RATING	--	18	18	18	18
6	GROSS RATED HORSEPOWER	BHP	399.	655.	400.	655.
7	NUMBER OF TRACKS OR TIRES	--	4.	4.	4.	4.
8	NUMBER OF AXLES	--	2	2	2	2
9	VEHICLE WIDTH	IN.	114.0	114.0	114.0	114.0
10	VEHICLE LENGTH	IN.	228.0	228.0	228.0	228.0
11	TRACK WIDTH OR NOMINAL TIRE WIDTH	IN.	14.7	14.7	16.7	16.7
12	WHEEL RIM DIAMETER ON ROAD WHEEL RADIUS	IN.	20.0	20.0	20.0	20.0
13	RECOMMENDED TIRE PRESSURE (CROSS-COUNTRY)	PSI	51	55	40	43
14	AREA OF ONE-TRACK SHOE (TRACKED) OR NUMBER OF WHEELS (WHEELED) (DUALS AS ONE)	SQ IN. OR #	4	4	4	4
15	NUMBER OF BOGIES (TRACKED) OR CHAIN INDICATOR WHEELED (0=NO CHAINS; 1=CHAINS)	--	0	0	0	0
16	VEHICLE GROUND CLEARANCE AT THE CENTER OF GREATEST WHEEL SPAN	IN.	17.5	17.5	18.8	18.8
17	MINIMUM VEHICLE GROUND CLEARANCE	IN.	15.0	15.0	16.3	16.3
18	REAR END CLEARANCE (VERTICAL CLEARANCE OF VEHICLE'S TRAILING EDGE)	IN.	23.0	23.0	24.3	24.3
19	VEHICLE DEPARTURE ANGLE	DEG	48.0	48.0	49.0	49.0
20	VEHICLE APPROACH ANGLE	DEG	55.0	55.0	56.0	56.0
21	LENGTH OF TRACK ON GROUND OR WHEEL DIAMETER	IN.	48.7	48.7	51.8	51.8
22	HEIGHT OF VEHICLE PUSHBAR, BUMPER, OR LEADING EDGE	IN,	35.0	35.0	36.3	36.3
23	DISTANCE BETWEEN FIRST AND LAST WHEEL CENTER LINES	IN.	156.0	156.0	156.0	156.0
24	HORIZONTAL DISTANCE FROM THE CENTER OF GRAVITY TO THE FRONT WHEEL CENTER LINES	IN.	78.0	78.0	78.0	78.0
25	VERTICAL DISTANCE FROM THE CENTER OF GRAVITY TO THE ROAD WHEEL CENTER LINES	IN.	24.2	24.2	24.2	24.2
26	MAXIMUM SPAN BETWEEN ADJACENT WHEEL CENTER LINES	IN.	156.0	156.0	156.0	156.0
27	VERTICAL DISTANCE FROM THE GROUND TO CENTER OF REAR WHEEL (IDLER OR SPROCKET FOR TRACKED VEHICLE)	IN.	22.0	22.0	23.3	23.3
28	TRACK THICKNESS PLUS THE RADIUS OF THE REAR IDLER OR SPROCKET	IN.	NA	NA	NA	NA
29	ROAD WHEEL RADIUS PLUS TRACK THICKNESS	IN.	NA	NA	NA	NA
30	LOADED ROLLING RADIUS OF TIRE (CROSS-COUNTRY TIRE PRESSURE) OR SPROCKET PITCH RADIUS	IN.	22.0	22.0	23.3	23.3
31	HEIGHT OF RIGID POINT USED TO DETERMINE APPROACH ANGLE	IN.	35.0	35.0	36.3	36.3
32	MAXIMUM BRAKING FORCE THE VEHICLE DEVELOPS	LBS	21,024.	22,446.	21,347.	22,770.
33	LOADED WHEEL DEFLECTION (AT SAND TIRE PRESSURE)	%	25.	25.	25.	25.
34	DISTANCE VEHICLE SPANS BEFORE SIGNIFICANT MOTION BEGINS	IN.	24.4	24.4	25.9	25.9
35	MAXIMUM FORCE THE PUSHBAR CAN WITHSTAND	KIPS	52.6	56.1	53.4	56.9
36	MAXIMUM AXLE LOAD/GROSS VEHICLE WEIGHT	--	0.500	0.500	0.500	0.500
37	VEHICLE RATED HORSEPOWER PER TON	HP/TON	30.4	46.7	30.0	46.0
38	TRANSMISSION TYPE (0=AUTOMATIC, 1=MANUAL)	--	0.	0.	0.	0.
39	FINAL DRIVE GEAR RATIO	--	5.29	9.26	5.29	9.26
40	FINAL DRIVE GEAR EFFICIENCY	--	0.95	0.95	0.95	0.95
41	NUMBER OF GEAR RATIOS	--	5.	6.	5.	6.
42	TRANSMISSSION EFFICIENCY	--	0.95	0.95	0.95	0.95

(Continued)

Table A1 (Continued)

NO.	IDENTIFICATION	DIMEN-SIONS	MC5	MC6	MC7	MC8
1	VEHICLE TYPE (NVEH=0 FOR TRACKED AND 1 FOR WHEELED)	--	1	1	1	1
2	GROSS VEHICLE WEIGHT	LBS	27,450.	29,220.	27,984.	29,859.
3	TRACK TYPE (NFL=0 FOR FLEXIBLE AND 1 FOR GIRDERIZED)	NA	NA	NA	NA	NA
4	GROUSER HEIGHT FOR TRACKS	IN.	NA	NA	NA	NA
5	TIRE PLY RATING	--	18	18	18	18
6	GROSS RATED HORSEPOWER	BHP	400.	655.	400.	655.
7	NUMBER OF TRACKS OR TIRES	--	6.	6.	6.	6.
8	NUMBER OF AXLES	--	3	3	3	3
9	VEHICLE WIDTH	IN.	114.0	114.0	114.0	114.0
10	VEHICLE LENGTH	IN.	228.0	228.0	228.0	228.0
11	TRACK WIDTH OR NOMINAL TIRE WIDTH	IN.	14.7	14.7	16.7	16.7
12	WHEEL RIM DIAMETER ON ROAD WHEEL RADIUS	IN.	20.0	20.0	20.0	20.0
13	RECOMMENDED TIRE PRESSURE (CROSS-COUNTRY)	PSI	38	41	27	28
14	AREA OF ONE-TRACK SHOE (TRACKED) OR NUMBER OF WHEELS (WHEELED) (DUALS AS ONE)	SQ IN. OR 0	6	6	6	6
15	NUMBER OF BOGIES (TRACKED) OR CHAIN INDICATOR WHEELED (0=NO CHAINS; 1=CHAINS)	--	0	0	0	0
16	VEHICLE GROUND CLEARANCE AT THE CENTER OF GREATEST WHEEL SPAN	IN.	17.5	17.5	18.8	18.8
17	MINIMUM VEHICLE GROUND CLEARANCE	IN.	15.0	15.0	16.3	16.3
18	REAR END CLEARANCE (VERTICAL CLEARANCE OF VEHICLE'S TRAILING EDGE)	IN.	23.0	23.0	24.3	24.3
19	VEHICLE DEPARTURE ANGLE	DEG	65.0	65.0	66.0	66.0
20	VEHICLE APPROACH ANGLE	DEG	67.0	67.0	68.0	68.0
21	LENGTH OF TRACK ON GROUND OR WHEEL *DIAMETER*	IN.	48.7	48.7	51.8	51.8
22	HEIGHT OF VEHICLE PUSHBAR, BUMPER, OR LEADING EDGE	IN.	35.0	35.0	36.3	36.3
23	DISTANCE BETWEEN FIRST AND LAST WHEEL CENTER LINES	IN.	174.0	174.0	174.0	174.0
24	HORIZONTAL DISTANCE FROM THE CENTER OF GRAVITY TO THE FRONT WHEEL CENTER LINES	IN.	96.0	96.0	96.0	96.0
25	VERTICAL DISTANCE FROM THE CENTER OF GRAVITY TO THE ROAD WHEEL CENTER LINES	IN.	25.8	25.8	25.8	25.8
26	MAXIMUM SPAN BETWEEN ADJACENT WHEEL CENTER LINES	IN.	114.0	114.0	114.0	114.0
27	VERTICAL DISTANCE FROM THE GROUND TO CENTER OF REAR WHEEL (IDLER OR SPROCKET FOR TRACKED VEHICLE)	IN.	22.0	22.0	23.3	23.3
28	TRACK THICKNESS PLUS THE RADIUS OF THE REAR IDLER OR SPROCKET	IN.	NA	NA	NA	NA
29	ROAD WHEEL RADIUS PLUS TRACK THICKNESS	IN.	NA	NA	NA	NA
30	LOADED ROLLING RADIUS OF TIRE (CROSS-COUNTRY TIRE PRESSURE) OR SPROCKET PITCH RADIUS	IN.	22.0	22.0	23.3	23.3
31	HEIGHT OF RIGID POINT USED TO DETERMINE APPROACH ANGLE	IN.	35.0	35.0	36.3	36.3
32	MAXIMUM BRAKING FORCE THE VEHICLE DEVELOPS	LBS	21,960.	23,376.	22,387.	23,887.
33	LOADED WHEEL DEFLECTION (AT SAND TIRE PRESSURE)	%	25.	25.	25.	25.
34	DISTANCE VEHICLE SPANS BEFORE SIGNIFICANT MOTION BEGINS	IN.	24.4	24.4	24.4	24.4
35	MAXIMUM FORCE THE PUSHBAR CAN WITHSTAND	KIPS	54.9	58.4	56.0	59.7
36	MAXIMUM AXLE LOAD/GROSS VEHICLE WEIGHT	--	0.330	0.330	0.330	0.330
37	VEHICLE RATED HORSEPOWER PER TON	HP/TON	29.2	44.8	28.6	43.9
38	TRANSMISSION TYPE (0=AUTOMATIC, 1=MANUAL)	--	1.	0.	0.	0.
39	FINAL DRIVE GEAR RATIO	--	5.29	9.26	5.29	9.26
40	FINAL DRIVE GEAR EFFICIENCY	--	0.95	0.95	0.95	0.95
41	NUMBER OF GEAR RATIOS	--	5.	6.	5.	6.
42	TRANSMISSSION EFFICIENCY	--	0.95	0.95	0.95	0.95

(Continued)

Table A1 (Concluded)

NO.	IDENTIFICATION	DIMEN-SIONS	MC9	MC10	MC11	MC12
1	VEHICLE TYPE (NVEH=0 FOR TRACKED AND 1 FOR WHEELED)	--	1	1	1	1
2	GROSS VEHICLE WEIGHT	LB%	28,340.	30,128.	30,212.	32,000.
3	TRACK TYPE (NFL=0 FOR FLEXIBLE AND 1 FOR GIRDERIZED)	NA	NA	NA	NA	NA
4	GROUSER HEIGHT FOR TRACKS	IN.	NA	NA	NA	NA
5	TIRE PLY RATING	--	18	18	18	18
6	GROSS RATED HORSEPOWER	BHP	400.	655.	400.	655.
7	NUMBER OF TRACKS OR TIRES	--	8.	8.	8.	8.
8	NUMBER OF AXLES	--	4	4	4	4
9	VEHICLE WIDTH	IN.	114.0	114.0	114.0	114.0
10	VEHICLE LENGTH	IN.	240.0	240.0	240.0	240.0
11	TRACK WIDTH OR NOMINAL TIRE WIDTH	IN.	14.7	14.7	16.7	16.7
12	WHEEL RIM DIAMETER ON ROAD WHEEL RADIUS	IN.	20.0	20.0	20.0	20.0
13	RECOMMENDED TIRE PRESSURE (CROSS-COUNTRY)	PSI	31	33	21	22
14	AREA OF ONE-TRACK SHOE (TRACKED) OR NUMBER OF WHEELS (WHEELED) (DUALS AS ONE)	SQ IN. OR 0	8	8	8	8
15	NUMBER OF BOGIES (TRACKED) OR CHAIN INDICATOR WHEELED (0=NO CHAINS; 1=CHAINS)	--	0	0	0	0
16	VEHICLE GROUND CLEARANCE AT THE CENTER OF GREATEST WHEEL SPAN	IN.	17.5	17.5	18.8	18.8
17	MINIMUM VEHICLE GROUND CLEARANCE	IN.	15.0	15.0	16.3	16.3
18	REAR END CLEARANCE (VERTICAL CLEARANCE OF VEHICLE'S TRAILING EDGE)	IN.	23.0	23.0	24.3	24.3
19	VEHICLE DEPARTURE ANGLE	DEG	62.0	62.0	63.0	63.0
20	VEHICLE APPROACH ANGLE	DEG	70.0	70.0	71.0	71.0
21	LENGTH OF TRACK ON GROUND OR WHEEL DIAMETER	IN.	48.7	48.7	51.8	51.8
22	HEIGHT OF VEHICLE PUSHBAR, BUMPER, OR LEADING EDGE	IN.	35.0	35.0	36.3	36.3
23	DISTANCE BETWEEN FIRST AND LAST WHEEL CENTER LINES	IN.	180.0	180.0	180.0	180.0
24	HORIZONTAL DISTANCE FROM THE CENTER OF GRAVITY TO THE FRONT WHEEL CENTER LINES	IN.	93.6	93.6	93.6	93.6
25	VERTICAL DISTANCE FROM THE CENTER OF GRAVITY TO THE ROAD WHEEL CENTER LINES	IN.	25.0	25.0	25.0	25.0
26	MAXIMUM SPAN BETWEEN ADJACENT WHEEL CENTER LINES	IN.	60.0	60.0	60.0	60.0
27	VERTICAL DISTANCE FROM THE GROUND TO CENTER OF REAR WHEEL (IDLER OR SPROCKET FOR TRACKED VEHICLE)	IN.	22.0	22.0	23.3	23.3
28	TRACK THICKNESS PLUS THE RADIUS OF THE REAR IDLER OR SPROCKET	IN.	NA	NA	NA	NA
29	ROAD WHEEL RADIUS PLUS TRACK THICKNESS	IN.	NA	NA	NA	NA
30	LOADED ROLLING RADIUS OF TIRE (CROSS-COUNTRY TIRE PRESSURE) OR SPROCKET PITCH RADIUS	IN.	22.0	22.0	23.3	23.3
31	HEIGHT OF RIGID POINT USED TO DETERMINE APPROACH ANGLE	IN.	35.0	35.0	36.3	36.3
32	MAXIMUM BRAKING FORCE THE VEHICLE DEVELOPS	LBS	22,672.	24,102.	24,170.	25,600.
33	LOADED WHEEL DEFLECTION (AT SAND TIRE PRESSURE)	%	25.	25.	25.	25.
34	DISTANCE VEHICLE SPANS BEFORE SIGNIFICANT MOTION BEGINS	IN.	60.0	60.0	60.0	60.9
35	MAXIMUM FORCE THE PUSHBAR CAN WITHSTAND	KIPS	56.7	60.3	60.4	64.0
36	MAXIMUM AXLE LOAD/GROSS VEHICLE WEIGHT	--	0.260	0.260	0.260	0.260
37	VEHICLE RATED HORSEPOWER PER TON	HP/TON	28.2	43.5	26.5	40.9
38	TRANSMISSION TYPE (0=AUTOMATIC, 1=MANUAL)	--	0.	0.	0.	0.
39	FINAL DRIVE GEAR RATIO	--	5.29	9.26	5.29	9.26
40	FINAL DRIVE GEAR EFFICIENCY	--	0.95	0.95	0.95	0.95
41	NUMBER OF GEAR RATIOS	--	5.	6.	5.	6.
42	TRANSMISSSION EFFICIENCY	--	0.95	0.95	0.95	0.95

(Sheet 3 of 3)

Table A2

Gear Ratios for Study Vehicles

VEHICLES	GEAR RATIOS G1	G2	G3	G4	G5	G6
MC1	7.97	3.19	2.02	1.38	1.00	
MC2	4.00	2.68	2.01	1.55	1.00	0.67
MC3	7.97	3.19	2.02	1.38	1.00	
MC4	4.00	2.68	2.01	1.55	1.00	0.67
MC5	7.97	3.19	2.02	1.38	1.00	
MC6	4.00	2.68	2.01	1.55	1.00	0.67
MC7	7.97	3.19	2.02	1.38	1.00	
MC8	4.00	2.68	2.01	1.55	1.00	0.67
MC9	7.97	3.19	2.02	1.38	1.00	
MC10	4.00	2.68	2.01	1.55	1.00	0.67
MC11	7.97	3.19	2.02	1.38	1.00	
MC12	4.00	2.68	2.01	1.55	1.00	0.67

Table A3

Tractive Force versus Vehicle Speed

MC1		MC2		MC3		MC4	
VEHICLE SPEED MPH	TRACTIVE FORCE LB	VEHICLE SPEED MPH	TRACTIVE FORCE LB	VEHICLE SPEED MPH	TRACTIVE FORCE LB	VEHICLE SPEED MPH	TRACTIVE FORCE LB
0.	46,966	0.	62,403	0.	44,402	0.	58,936
1.1	41,629	1.9	48,667	1.1	39,357	2.0	45,963
2.1	35,471	3.8	36,126	2.6	33,535	4.1	34,119
3.2	30,089	5.7	27,143	3.3	28,446	6.1	25,635
4.3	24,505	6.3	25,056	4.4	23,168	6.7	23,664
4.6	23,375	6.6	24,534	4.9	22,099	7.0	23,171
5.3	21,885	7.7	22,664	5.6	20,691	8.1	21,405
5.6	20,793	8.8	21,407	5.9	19,658	9.3	20,218
6.3	17,511	9.6	16,510	6.7	16,555	10.1	15,593
7.7	15,576	10.0	16,017	8.2	14,726	10.5	15,127
9.5	10,861	11.5	15,015	10.0	10,268	12.2	14,181
10.5	9,971	13.1	14,197	11.1	9,426	13.9	13,409
11.7	9,515	13.2	12,177	12.3	8,996	14.0	11,501
12.6	9,158	13.4	12,151	13.3	8,658	14.2	11,476
13.3	8,844	15.3	11,435	14.1	8,361	16.2	10,800
14.3	7,494	17.2	10,830	15.1	7,085	18.3	10,229
15.9	7,128	17.5	9,069	16.8	6,739	18.6	8,565
16.8	6,946	19.2	8,320	17.8	6,567	20.3	7,857
18.0	6,625	19.7	8,118	19.1	6,263	20.9	7,667
20.0	5,801	21.1	7,998	21.1	5,485	22.3	7,554
20.9	5,633	23.0	7,575	22.1	5,325	24.3	7,154
23.1	4,572	24.9	7,238	24.5	4,322	26.4	6,836
25.1	4,522	26.2	7,193	26.6	4,275	27.7	6,794
27.3	4,336	26.6	6,085	28.9	4,099	28.2	5,747
28.4	4,079	28.7	5,970	30.0	3,856	30.4	5,639
31.4	3,827	30.7	5,740	33.2	3,618	32.4	5,422
36.8	3,127	34.5	5,400	38.9	2,956	36.5	5,100
39.9	3,001	36.4	4,340	42.3	2,837	38.5	4,100
42.7	2,867	38.3	4,160	45.1	2,710	40.6	3,930
46.9	2,323	42.2	3,982	42.9	2,196	44.6	3,761
50.8	2,259	46.0	3,778	53.7	2,136	48.7	3,568
54.7	2,178	49.8	3,602	57.8	2,059	52.7	3,402
58.9	2,072	53.6	3,114	62.3	1,959	56.8	2,941
63.0	866	55.6	1,510	66.6	819	58.8	1,426
63.0	0	56.5	786	66.6	0	59.8	742
		56.5	0			59.8	0

(Continued)

Table A3 (Continued)

MC5		MC6		MC7		MC8	
VEHICLE SPEED MPH	TRACTIVE FORCE LB	VEHICLE SPEED MPH	TRACTIVE FORCE LB	VEHICLE SPEED MPH	TRACTIVE FORCE LB	VEHICLE SPEED MPH	TRACTIVE FORCE LB
0.	46,966	0.	62,403	0.	44,402	0.	58,936
1.1	41,629	1.9	48,667	1.1	39,357	2.0	45,963
2.1	35,471	3.8	36,126	2.6	33,535	4.1	34,119
3.2	30,089	5.7	27,143	3.3	28,446	6.1	25,635
4.3	24,505	6.3	25,056	4.4	23,168	6.7	23,664
4.6	23,375	6.6	24,534	4.9	22,099	7.0	23,171
5.3	21,885	7.7	22,664	5.6	20,691	8.1	21,405
5.6	20,793	8.8	21,407	5.9	19,658	9.3	20,218
6.3	17,511	9.6	16,510	6.7	16,555	10.1	15,593
7.7	15,576	10.0	16,017	8.2	14,726	10.5	15,127
9.5	10,861	11.5	15,015	10.0	10,268	12.2	14,181
10.5	9,971	13.1	14,197	11.1	9,426	13.9	13,409
11.7	9,515	13.2	12,177	12.3	8,996	14.0	11,501
12.6	9,158	13.4	12,151	13.3	8,658	14.2	11,476
13.3	8,844	15.3	11,435	14.1	8,361	16.2	10,800
14.3	7,494	17.2	10,830	15.1	7,085	18.3	10,229
15.9	7,128	17.5	9,069	16.8	6,739	18.6	8,565
16.8	6,946	19.2	8,320	17.8	6,567	20.3	7,857
18.0	6,625	19.7	8,118	19.1	6,263	20.9	7,667
20.0	5,801	21.1	7,998	21.1	5,485	22.3	7,554
20.9	5,633	23.0	7,575	22.1	5,325	24.3	7,154
23.1	4,572	24.9	7,238	24.5	4,322	26.4	6,836
25.1	4,522	26.2	7,193	26.6	4,275	27.7	6,794
27.3	4,336	26.6	6,085	28.9	4,099	28.2	5,747
28.4	4,079	28.7	5,970	30.0	3,856	30.4	5,639
31.4	3,827	30.7	5,740	33.2	3,618	32.4	5,422
36.8	3,127	34.5	5,400	38.9	2,956	36.5	5,100
39.9	3,001	36.4	4,340	42.3	2,837	38.5	4,100
42.7	2,867	38.3	4,160	45.1	2,710	40.6	3,930
46.9	2,323	42.2	3,982	42.9	2,196	44.6	3,761
50.8	2,259	46.0	3,778	53.7	2,136	48.7	3,568
54.7	2,178	49.8	3,602	57.8	2,059	52.7	3,402
58.9	2,072	53.6	3,114	62.3	1,959	56.8	2,941
63.0	866	55.6	1,510	66.6	819	58.8	1,426
63.0	0	56.5	786	66.6	0	59.8	742
		56.5	0			59.8	0

(Continued)

Table A3 (Concluded)

MC9		MC10		MC11		MC12	
VEHICLE SPEED MPH	TRACTIVE FORCE LB	VEHICLE SPEED MPH	TRACTIVE FORCE LB	VEHICLE SPEED MPH	TRACTIVE FORCE LB	VEHICLE SPEED MPH	TRACTIVE FORCE LB
0.	46,966	0.	62,403	0.	44,402	0.	58,936
1.1	41,629	1.9	48,667	1.1	39,357	2.0	45,963
2.1	35,471	3.8	36,126	2.6	33,535	4.1	34,119
3.2	30,089	5.7	27,143	3.3	28,446	6.1	25,635
4.3	24,505	6.3	25,056	4.4	23,168	6.7	23,664
4.6	23,375	6.6	24,534	4.9	22,099	7.0	23,171
5.3	21,885	7.7	22,664	5.6	20,691	8.1	21,405
5.6	20,793	8.8	21,407	5.9	19,658	9.3	20,218
6.3	17,511	9.6	16,510	6.7	16,555	10.1	15,593
7.7	15,576	10.0	16,017	8.2	14,726	10.5	15,127
9.5	10,861	11.5	15,015	10.0	10,268	12.2	14,181
10.5	9,971	13.1	14,197	11.1	9,426	13.9	13,409
11.7	9,515	13.2	12,177	12.3	8,996	14.0	11,501
12.6	9,158	13.4	12,151	13.3	8,658	14.2	11,476
13.3	8,844	15.3	11,435	14.1	8,361	16.2	10,800
14.3	7,494	17.2	10,830	15.1	7,085	18.3	10,229
15.9	7,128	17.5	9,069	16.8	6,739	18.6	8,565
16.8	6,946	19.2	8,320	17.8	6,567	20.3	7,857
18.0	6,625	19.7	8,118	19.1	6,263	20.9	7,667
20.0	5,801	21.1	7,998	21.1	5,485	22.3	7,554
20.9	5,633	23.0	7,575	22.1	5,325	24.3	7,154
23.1	4,572	24.9	7,238	24.5	4,322	26.4	6,836
25.1	4,522	26.2	7,193	26.6	4,275	27.7	6,794
27.3	4,336	26.6	6,085	28.9	4,099	28.2	5,747
28.4	4,079	28.7	5,970	30.0	3,856	30.4	5,639
31.4	3,827	30.7	5,740	33.2	3,618	32.4	5,422
36.8	3,127	34.5	5,400	38.9	2,956	36.5	5,100
39.9	3,001	36.4	4,340	42.3	2,837	38.5	4,100
42.7	2,867	38.3	4,160	45.1	2,710	40.6	3,930
46.9	2,323	42.2	3,982	42.9	2,196	44.6	3,761
50.8	2,259	46.0	3,778	53.7	2,136	48.7	3,568
54.7	2,178	49.8	3,602	57.8	2,059	52.7	3,402
58.9	2,072	53.6	3,114	62.3	1,959	56.8	2,941
63.0	866	55.6	1,510	66.6	819	58.8	1,426
63.0	0	56.5	1,510	66.6	0	59.8	742
		56.5	786			59.8	0
		56.5	0				

(Sheet 3 of 3)

Table A4

Vehicle Speed versus Surface Roughness

MC1		MC2		MC3		MC4	
ELEVATION RMS IN.	SPEED MPH	ELEVATION RMS IN.	SPEED MPH	ELEVATION RMS IN.	SPEED MPH	ELEVATION RMS IN.	SPEED MPH
0.	55.00	0.	55.00	0.	55.00	0.	55.00
0.65	55.00	0.65	55.00	0.65	55.00	0.65	55.00
0.70	45.00	0.70	45.00	0.70	45.00	0.70	45.00
0.75	37.50	0.75	37.50	0.75	37.50	0.75	37.50
0.80	34.00	0.80	34.00	0.80	34.00	0.80	34.00
0.90	28.50	0.90	28.50	0.90	28.50	0.90	28.50
1.00	25.50	1.00	25.50	1.00	25.50	1.00	25.50
1.10	23.00	1.10	23.00	1.10	23.00	1.10	23.00
1.25	21.00	1.25	21.00	1.25	21.00	1.25	21.00
1.50	19.00	1.50	19.00	1.50	19.00	1.50	19.00
2.00	17.00	2.00	17.00	2.00	17.00	2.00	17.00
3.00	15.20	3.00	15.20	3.00	15.20	3.00	15.20
4.00	15.00	4.00	15.00	4.00	15.00	4.00	15.00
5.00	14.50	5.00	14.50	5.00	14.50	5.00	14.50

MC5		MC6		MC7		MC8	
ELEVATION RMS IN.	SPEED MPH	ELEVATION RMS IN.	SPEED MPH	ELEVATION RMS IN.	SPEED MPH	ELEVATION RMS IN.	SPEED MPH
0.	55.00	0.	55.00	0.	55.00	0.	55.00
0.65	55.00	0.65	55.00	0.65	55.00	0.65	55.00
0.70	49.00	0.70	49.00	0.70	49.00	0.70	49.00
0.75	43.00	0.75	43.00	0.75	43.00	0.75	43.00
0.80	38.00	0.80	38.00	0.80	38.00	0.80	38.00
0.90	32.00	0.90	32.00	0.90	32.00	0.90	32.00
0.95	29.50	0.95	29.50	0.95	29.50	0.95	29.50
1.00	27.20	1.00	27.20	1.00	27.20	1.00	27.20
1.10	25.00	1.10	25.00	1.10	25.00	1.10	25.00
1.25	23.00	1.25	23.00	1.25	23.00	1.25	23.00
1.50	21.30	1.50	21.30	1.50	21.30	1.50	21.30
2.00	19.50	2.00	19.50	2.00	19.50	2.00	19.50
3.00	17.00	3.00	17.00	3.00	17.00	3.00	17.00
4.00	15.80	4.00	15.80	4.00	15.80	4.00	15.80
5.00	14.50	5.00	14.50	5.00	14.50	5.00	14.50

MC9		MC10		MC11		MC12	
ELEVATION RMS IN.	SPEED MPH	ELEVATION RMS IN.	SPEED MPH	ELEVATION RMS IN.	SPEED MPH	ELEVATION RMS IN.	SPEED MPH
0.	55.00	0.	55.00	0.	55.00	0.	55.00
0.65	55.00	0.65	55.00	0.65	55.00	0.65	55.00
0.75	48.00	0.75	48.00	0.75	48.00	0.75	48.00
0.85	42.00	0.85	42.00	0.85	42.00	0.85	42.00
1.00	35.50	1.00	35.50	1.00	35.50	1.00	35.50
1.20	30.50	1.20	30.50	1.20	30.50	1.20	30.50
1.50	26.50	1.50	26.50	1.50	26.50	1.50	26.50
2.00	22.50	2.00	22.50	2.00	22.50	2.00	22.50
2.50	20.00	2.50	20.00	2.50	20.00	2.50	20.00
3.00	18.20	3.00	18.20	3.00	18.20	3.00	18.20
4.00	16.00	4.00	16.00	4.00	16.00	4.00	16.00
5.00	14.50	5.00	14.50	5.00	14.50	5.00	14.50

Table A5

Vehicle Speed at 2.5-g Acceleration versus Obstacle Height

MC1		MC2		MC3		MC4	
OBSTACLE HEIGHT IN.	VEHICLE SPEED MPH	OBSTACLE HEIGHT IN.	VEHICLE SPEED MPH	OBSTACLE HEIGHT IN.	VEHICLE SPEED MPH	OBSTACLE HEIGHT IN.	VEHICLE SPEED MPH
0.	55.00	0.	55.00	0.	55.00	0.	55.00
6.00	55.00	6.00	55.00	6.00	55.00	6.00	55.00
8.00	29.00	8.00	29.00	8.00	29.00	8.00	29.00
8.50	22.00	8.50	22.00	8.50	22.00	8.50	22.00
9.00	19.00	9.00	19.00	9.00	19.00	9.00	19.00
10.00	15.60	10.00	15.60	10.00	15.60	10.00	15.60
12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
14.00	9.60	14.00	9.60	14.00	9.60	14.00	9.60
16.00	8.00	16.00	8.00	16.00	8.00	16.00	8.00
18.00	7.20	18.00	7.20	18.00	7.20	18.00	7.20
60.00	2.00	60.00	2.00	60.00	2.00	60.00	2.00

MC5		MC6		MC7		MC8	
OBSTACLE HEIGHT IN.	VEHICLE SPEED MPH	OBSTACLE HEIGHT IN.	VEHICLE SPEED MPH	OBSTACLE HEIGHT IN.	VEHICLE SPEED MPH	OBSTACLE HEIGHT IN.	VEHICLE SPEED MPH
0.	55.00	0.	55.00	0.	55.00	0.	55.00
6.00	55.00	6.00	55.00	6.00	55.00	6.00	55.00
8.00	55.00	8.00	55.00	8.00	55.00	8.00	55.00
8.50	22.00	8.50	22.00	8.50	22.00	8.50	22.00
9.00	17.00	9.00	17.00	9.00	17.00	9.00	17.00
10.00	12.50	10.00	12.50	10.00	12.50	10.00	12.50
12.00	8.20	12.00	8.20	12.00	8.20	12.00	8.20
14.00	6.40	14.00	6.40	14.00	6.40	14.00	6.40
16.00	5.50	16.00	5.50	16.00	5.50	16.00	5.50
18.00	5.00	18.00	5.00	18.00	5.00	18.00	5.00
60.00	2.00	60.00	2.00	60.00	2.00	60.00	2.00

MC9		MC10		MC11		MC12	
OBSTACLE HEIGHT IN.	VEHICLE SPEED MPH	OBSTACLE HEIGHT IN.	VEHICLE SPEED MPH	OBSTACLE HEIGHT IN.	VEHICLE SPEED MPH	OBSTACLE HEIGHT IN.	VEHICLE SPEED MPH
0.	55.00	0.	55.00	0.	55.00	0.	55.00
8.00	55.00	8.00	55.00	8.00	55.00	8.00	55.00
9.00	22.50	9.00	22.50	9.00	22.50	9.00	22.50
10.00	14.10	10.00	14.10	10.00	14.10	10.00	14.10
11.00	10.30	11.00	10.30	11.00	10.30	11.00	10.30
12.00	9.40	12.00	9.40	12.00	9.40	12.00	9.40
13.00	8.20	13.00	8.20	13.00	8.20	13.00	8.20
14.00	6.00	14.00	6.00	14.00	6.00	14.00	6.00
16.00	4.80	16.00	4.80	16.00	4.80	16.00	4.80
18.00	4.20	18.00	4.20	18.00	4.20	18.00	4.20
60.00	2.00	60.00	2.00	60.00	2.00	60.00	2.00

Table A6

Data Required for the Vehicle Dynamics (VDM-74) Model

No.	Identification		Dimension	4x4	6x6	8x8
1	Vehicle type 1 = wheeled, 2 = tracked		--	1	1	1
2	Suspension type 1 = independent, 2 = bogie or walking beam, 3 = no unsprung assemblies, 4 = any combination of 1, 2, or 3		--	1	1	1
3	Number of wheels on one side		--	2	3	4
4	Gross vehicle weight		lbs	27,169	28,921	31,106
5	Patch inertia of sprung mass about cg		lbs-sec^2-in	242,117	257,730	277,202
6	Longitudal distance from cg		in.	58	68	60
7	Weight of driver 0 = motion at driver seat disregarding seat dynamics weight of driver = motion at driver seat plus seat dynamics		lbs	0	0	0
8	Weight of unsprung masses	1st axle	lbs	780	650	550
		2nd axle		780	650	550
		3rd axle		--	650	550
		4th axle		--	--	550
9	Longitudinal distance of each wheel centerline from cg positive if forward of cg; negative if rearward	1st axle	in.	78	93.3	93.6
		2nd axle		78-	16.7-	33.6
		3rd axle		--	76.7-	26.4-
		4th axle		--	--	86.4-
10	Segmented wheel characteristics		--	NA	NA	NA
11	Wheel radii (undeflected)		in.	25.9	25.9	25.9
12	Tire deflection values		in.	1.9	1.9	1.9
13	Tire force values	1st axle	lbs	6,792	4,820	3,654
		2nd axle		6,792	4,820	3,654
		3rd axle		--	4,820	3,654
		4th axle		--	--	3,654
14	Wheel suspension identification		--	NA	NA	NA
15	Length of bogie or beam arm		in.	NA	NA	NA
16	Moment of inertia of bogie and beam assemblies		lbs-sec^2-in.	NA	NA	NA
17	Bogie or beam rotational damping		lb-in.	NA	NA	NA
18	Suspension force deflection rotations	1st axle	lb-in.	1,090	760	560
		2nd axle		1,090	760	560
		3rd axle		--	760	560
		4th axle		--	--	560
19	Suspension force-velocity realtion	1st axle	lbs-sec-in.	85	70	55
		2nd axle		85	70	55
		3rd axle		--	70	60
		4th axle		--	--	60
20	Vertical distance from the center of gravity to the ground		in.	47	47	47

Table A7

Terrain Data Required for AMC-74X and SWIMCRIT

Water Crossing Prediction Models

Terrain or Road Factor	Range
Off-Road	
Surface material	
Type, USCS or other	NA*
Mass strength, CI or RCI	0 - >280
Slope, percent	0 - >70
Obstacle	
Approach angle, deg	90 - 270
Vertical magnitude, cm	0 - >85
Length, m	0 - >150
Width, cm	0 - >1200
Spacing, m	0 - >60
Spacing, type	NA*
Surface roughness, rms elevations	0 - 10
Stem diameter, cm (8 pairs)	0 - >25
Stem spacing, m (8 pairs)	0 - >100
Visibility distance, m	0 - >50
Water depth, m	0 - >5
Water velocity, mps	0 - >3.5
Water width, m	0 - >70
Linear feature top width, m	0 - >70
Left approach angle, deg	90 - 270
Right approach angle, deg	90 - 270
Differential bank height or differential vertical magnitude, m	0 - >4
Low bank height or least vertical magnitude, m	0 - >6
On-Road	
Road type	NA*
Surface material	
Type, USCS or other	NA*
Surface strength	
Trails, CI or RCI	0 - >280
Other, traction coefficients	0.01 - >0.80
Slope, percent	0 - >70
Surface roughness, rms elevation	0 - >7.6
Curvature, deg	0 - 90
Roadside visibility distance (trails only), m	0 - >50

* NA = Not applicable.

Table A8

Terrain Data Used in the Ride Dynamics Model (VEHDYN) To Establish the Ride Curves

Name of Profile	rms (Roughness), in.
APG 9	1.03
APG 11	1.45
APG 14	1.17
APG 29	2.12
APG 37	0.67
SR4RT	3.88
SR5RT	2.33

APPENDIX B: DETAILED MOBILITY PERFORMANCE DATA

1. This appendix contains the speed profiles, the percent NOGO and reason for NOGO on the on-road and off-road terrains, and the performance data for the study vehicles crossing linear features (water crossings).

2. The speed profile data for the study vehicles over primary roads, secondary roads, trails, and off-road terrain for the dry, wet-wet slippery, and snow conditions for the Federal Republic of Germany study area are given in Tables B1-B12 and for the Mid-East study area are given in Tables B13-B24.

Tables	Study Area	Speed Profile for Study Vehicles
B1	Federal Republic of Germany	MC1, 14.00 R20XS, 435-hp, 4x4
B2	Federal Republic of Germany	MC2, 14.00 R20XS, 655-hp, 4x4
B3	Federal Republic of Germany	MC3, 16.00 R20XS, 435-hp, 4x4
B4	Federal Republic of Germany	MC4, 16.00 R20XS, 655-hp, 4x4
B5	Federal Republic of Germany	MC5, 14.00 R20XS, 435-hp, 6x6
B6	Federal Republic of Germany	MC6, 14.00 R20XS, 655-hp, 6x6
B7	Federal Republic of Germany	MC7, 16.00 R20XS, 435-hp, 6x6
B8	Federal Republic of Cermany	MC8, 16.00 R20XS, 655-hp, 6x6
B9	Federal Republic of Germnay	MC9, 14.00 R20XS, 435-hp, 8x8
B10	Federal Republic of Germany	MC10, 14.00 R20XS, 655-hp, 8x8
B11	Federal Republic of Germany	MC11, 16.00 R20XS, 435-hp, 8x8
B12	Federal Republic of Germany	MC12, 16.00 R20XS, 655-hp, 8x8
B13	Mid-East	MC1, 14.00 R20XS, 435-hp, 4x4
B14	Mid-East	MC2, 14.00 R20XS, 655-hp, 4x4
B15	Mid-East	MC3, 16.00 R20XS, 435-hp, 4x4
B16	Mid-East	MC4, 16.00 R20XS, 655-hp, 4x4
B17	Mid-East	MC5, 14.00 R20XS, 435-hp, 6x6
B18	Mid-East	MC6, 14.00 R20XS, 655-hp, 6x6
B19	Mid-East	MC7, 16.00 R20XS, 435-hp, 6x6

Tables	Study Area	Speed Profile for Study Vehicles
B20	Mid-East	MC8, 16.00 R20XS, 655-hp, 6x6
B21	Mid-East	MC9, 14.00 R20XS, 435-hp, 8x8
B22	Mid-East	MC10, 14.00 R20XS, 655-hp, 8x8
B23	Mid-East	MC11, 16.00 R20XS, 435-hp, 8x8
B24	Mid-East	MC12, 16.00 R20XS, 655-hp, 8x8

3. The percent NOGO on trails and off-road terrain for the dry, wet-wet slippery, and snow conditions in the HIMO study area in the Federal Republic of Germany is given in Table B25. The percent NOGO on roads and off-road for the dry, wet-wet slippery, and sand conditions of the HIMO Mid-East study area is given in Table B26.

4. The performance data for the study vehicles crossing linear features (water crossing) for the study areas in the Federal Republic of Germany and Mid-East study areas are given in Table B27.

Table B1

Speed Profile (mph) for MC1, 4x4, 14.00 R20XS Tires, 435-hp for Federal Republic of Germany Study Area

Dry Normal Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	54.9	54.8	54.6	54.4	54.3
6X	54.1	54.0	53.9	53.7	53.5
7X	53.0	52.2	51.1	50.1	48.8
8X	47.3	45.8	44.3	42.9	41.2
9X	39.7	38.3	37.1	35.8	34.2
10X	32.6				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	54.9	54.8	54.7	54.5	54.2
4X	54.1	53.8	53.5	53.2	52.9
5X	52.6	52.3	52.0	51.7	51.4
6X	51.1	50.8	50.3	49.7	49.0
7X	48.3	47.5	46.4	45.3	44.2
8X	43.0	41.8	40.4	39.1	37.8
9X	36.4	35.1	34.0	32.7	31.1
10X	29.7				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	34.0	33.0
1X	31.2	30.1	29.3	28.8	28.4
2X	28.1	27.8	27.4	26.7	26.0
3X	25.5	25.0	24.6	24.3	23.9
4X	23.5	23.0	22.7	22.3	22.1
5X	21.8	21.6	21.4	21.2	21.0
6X	20.8	20.7	20.5	20.4	20.3
7X	20.1	20.0	19.8	19.7	19.5
8X	19.4	19.3	19.2	19.1	19.0
9X	18.8	18.7	18.3	17.6	16.7
10X	16.0				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	53.3	50.8	48.7	47.2
1X	45.0	42.8	41.2	39.4	37.8
2X	36.4	35.1	33.9	32.8	31.8
3X	30.9	30.1	29.3	28.6	28.0
4X	27.4	26.8	26.3	25.8	25.4
5X	24.9	24.5	24.1	23.7	23.3
6X	22.9	22.5	22.1	21.7	21.3
7X	20.9	20.6	20.2	19.8	19.4
8X	19.0	18.5	18.1	17.6	16.9
9X	15.3	4.4	2.3	1.6	1.2
10X	1.0				

Wet-Wet Slippery Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55 0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	54.9
5X	54.7	54.5	54.4	54.2	54.1
6X	53.9	53.8	53.7	53.5	53.1
7X	52.4	51.4	50.1	48.8	47.3
8X	45.6	43.9	42.3	40.8	39.1
9X	37.4	36.0	34.8	33.5	31.9
10X	30.3				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.6	50.5	50.4
4X	50.3	50.1	49.9	49.7	49.4
5X	49.2	48.9	48.7	48.5	48.2
6X	47.9	47.7	47.2	46.7	46.0
7X	45.3	44.5	43.4	42.3	41.2
8X	40.1	38.9	37.6	36.3	35.0
9X	33.7	32.6	31.5	30.2	28.7
10X	27.4				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	33.7	32.2
1X	30.6	29.6	28.9	28.5	28.1
2X	27.8	27.6	27.2	26.4	25.8
3X	25.3	24.9	24.5	24.1	23.7
4X	23.3	22.9	22.5	22.2	21.9
5X	21.7	21.4	21.2	21.0	20.9
6X	20.7	20.6	20.4	20.3	20.2
7X	20.0	19.9	19.7	19.6	19.5
8X	19.3	19.2	19.1	19.0	18.9
9X	18.7	18.4	18.0	17.3	16.4
10X	15.7				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	43.5	35.5	31.4	28.2	25.7
1X	24.0	22.6	21.6	20.7	20.0
2X	19.4	18.9	18.5	18.0	17.7
3X	17.3	17.0	16.7	16.4	16.1
4X	15.9	15.6	15.4	15.1	14.8
5X	14.6	14.3	14.0	13.7	13.3
6X	13.0	12.5	11.0	2.6	1.5
7X	1.1	0.8	0.7	0.6	0.5
8X	0.5	0.4	0.4	0.4	0.4
9X	0.3	0.3	0.3	0.3	0.3
10X	0.3				

Snow Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	37.9	37.9	37.9	37.9	37.9
1X	37.9	37.9	37.8	37.7	37.6
2X	37.6	37.5	37.5	37.4	37.4
3X	37.4	37.4	37.3	37.3	37.3
4X	37.3	37.3	37.2	37.1	37.1
5X	37.0	36.8	36.6	36.4	36.2
6X	36.1	35.9	35.8	35.6	35.5
7X	35.4	35.1	34.7	34.3	33.7
3X	33.0	32.3	31.5	30.8	29.9
9X	29.0	28.2	27.5	26.8	25.7
10X	24.7				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	37.0	37.0	37.0	37.0	37.0
1X	37.0	37.0	37.0	37.0	37.0
2X	36.9	36.8	36.7	36.6	36.4
3X	36.3	36.1	35.9	35.8	35.5
4X	35.2	35.0	34.8	34.6	34.4
5X	34.2	34.1	33.9	33.8	33.6
6X	33.4	33.3	33.1	32.7	32.4
7X	32.0	31.5	30.9	30.2	29.6
8X	28.9	28.1	27.3	26.5	25.6
9X	24.7	23.9	23.2	22.3	21.3
10X	20.4				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	32.8	31.3	30.0	29.0
1X	28.2	27.7	27.2	26.7	26.2
2X	25.9	25.6	25.3	24.8	24.3
3X	24.0	23.7	23.4	23.0	22.6
4X	22.2	21.9	21.6	21.4	21.1
5X	20.9	20.8	20.6	20.4	20.3
6X	20.2	20.0	19.9	19.8	19.7
7X	19.5	19.4	19.3	19.1	19.0
8X	18.9	18.8	18.7	18.6	18.5
9X	18.4	18.3	17.9	17.2	16.4
10X	15.7				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	35.2	32.4	31.2	30.3	29.5
1X	28.8	28.2	27.5	26.8	26.2
2X	25.6	25.1	24.5	24.0	23.5
3X	23.1	22.7	22.2	21.9	21.3
4X	21.1	20.8	20.5	20.1	19.8
5X	19.5	19.2	18.9	18.6	18.3
6X	17.9	17.6	17.3	17.0	16.7
7X	16.4	16.0	15.6	15.2	14.7
8X	4.4	2.2	1.4	1.1	0.9
9X	0.8	0.7	0.6	0.5	0.5
10X	0.5				

Table B2

Speed Profile (mph) for MC2, 4x4, 14.00 R20XS Tires, 655-hp for Federal Republic of Germany Study Area

Dry Normal Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	54.9	54.9
6X	54.9	54.9	54.9	54.9	54.7
7X	54.1	53.2	52.1	51.0	49.6
8X	48.1	46.5	45.0	43.5	41.8
9X	40.2	38.8	37.5	36.2	34.6
10X	32.9				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	54.9	54.9
4X	54.9	54.9	54.8	54.8	54.7
5X	54.7	54.6	54.5	54.3	54.1
6X	53.8	53.5	53.2	52.7	52.0
7X	51.1	50.1	48.9	47.6	46.3
8X	45.0	43.6	42.1	40.6	39.1
9X	37.6	36.3	35.0	33.6	31.9
10X	30.4				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	34.0	33.2
1X	31.3	30.2	29.4	28.9	28.4
2X	28.1	27.9	27.4	26.7	26.0
3X	25.5	25.1	24.7	24.3	23.9
4X	23.5	23.1	22.7	22.4	22.1
5X	21.8	21.6	21.4	21.2	21.0
6X	20.8	20.7	20.5	20.4	20.3
7X	20.1	20.0	19.8	19.7	19.5
8X	19.4	19.3	19.2	19.1	19.0
9X	18.8	18.7	18.3	17.6	16.7
10X	16.0				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	54.6	53.6	50.8	49.0
1X	46.4	43.9	42.1	40.3	38.5
2X	37.0	35.6	34.4	33.3	32.3
3X	31.4	30.6	29.8	29.1	28.4
4X	27.8	27.2	26.7	26.2	25.8
5X	25.3	24.9	24.5	24.1	23.7
6X	23.3	22.9	22.5	22.2	21.8
7X	21.4	21.1	20.7	20.3	19.9
8X	19.5	19.1	18.7	18.2	17.7
9X	16.6	4.4	2.3	1.6	1.2
10X	1.0				

Wet-Wet Slippery Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	54.9	54.9	54.9
6X	54.9	54.9	54.9	54.7	54.3
7X	53.5	52.4	51.0	49.7	48.1
8X	46.3	44.6	42.9	41.3	39.5
9X	37.9	36.4	35.1	33.8	32.2
10X	30.6				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.7	50.7	50.6	50.5	50.3
6X	50.1	49.9	49.5	49.1	48.4
7X	47.6	46.6	45.4	44.2	42.9
8X	41.7	40.4	38.9	37.5	36.1
9X	34.7	33.4	32.3	31.0	29.4
10X	28.0				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	34.0	32.9
1X	31.1	30.0	29.2	28.7	28.3
2X	28.0	27.8	27.3	26.6	25.9
3X	25.4	25.0	24.6	24.3	23.9
4X	23.4	23.0	22.6	22.3	22.0
5X	21.8	21.5	21.3	21.1	20.9
6X	20.8	20.6	20.5	20.4	20.2
7X	20.1	19.9	19.8	19.6	19.5
8X	19.4	19.3	19.2	19.1	18.9
9X	18.8	18.4	17.8	16.9	16.1
10X	4.7				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	47.5	37.4	32.8	29.3	26.6
1X	24.6	23.1	21.9	20.9	20.1
2X	19.5	18.9	18.3	17.8	17.3
3X	16.9	16.5	16.1	15.7	15.4
4X	15.0	14.5	14.0	13.1	10.1
5X	2.1	1.2	0.8	0.7	0.6
6X	0.5	0.4	0.4	0.4	0.3
7X	0.3	0.3	0.3	0.3	0.3
8X	0.2	0.2	0.2	0.2	0.2
9X	0.2	0.2	0.2	0.2	0.2
10X	0.2				

Snow Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	48.7	48.7	48.7	48.7	48.7
1X	48.7	48.7	48.7	48.7	48.7
2X	48.7	48.7	48.7	48.7	48.7
3X	48.7	48.7	48.7	48.7	48.7
4X	48.5	48.3	48.1	47.8	47.6
5X	47.4	47.2	46.9	46.7	46.5
6X	46.4	46.2	46.0	45.9	45.6
7X	45.2	44.5	43.6	42.7	41.5
8X	40.2	38.9	37.7	36.4	35.0
9X	33.7	32.6	31.5	30.4	29.1
10X	27.7				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	39.3	39.3	39.3	39.3	39.3
1X	39.3	39.3	39.3	39.3	39.3
2X	39.3	39.3	39.3	39.2	39.2
3X	39.1	39.1	39.0	38.9	38.9
4X	38.8	38.8	38.7	38.6	38.6
5X	38.5	38.4	38.3	38.1	37.9
6X	37.8	37.6	37.4	37.1	36.5
7X	36.0	35.3	34.4	33.5	32.6
8X	31.7	30.7	29.6	28.6	27.6
9X	26.5	25.6	24.7	23.7	22.5
10X	21.4				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	33.9	33.5	32.2
1X	30.6	29.6	29.0	28.5	28.1
2X	27.8	27.6	27.2	26.5	25.9
3X	25.3	24.9	24.5	24.2	23.8
4X	23.3	22.9	22.5	22.2	21.9
5X	21.7	21.5	21.3	21.1	20.9
6X	20.7	20.6	20.5	20.3	20.2
7X	20.1	19.9	19.7	19.6	19.5
8X	19.4	19.2	19.1	19.0	18.9
9X	18.8	18.6	18.3	17.5	16.7
10X	15.9				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	43.3	39.3	37.6	36.1	34.9
1X	33.8	32.6	31.6	30.6	29.6
2X	28.8	27.9	27.2	26.5	25.8
3X	25.2	24.6	24.1	23.6	23.1
4X	22.7	22.3	21.9	21.5	21.1
5X	20.7	20.3	20.0	19.7	19.3
6X	18.9	18.6	18.2	17.9	17.5
7X	17.1	16.7	16.3	15.8	15.3
8X	4.5	2.2	1.5	1.1	0.9
9X	0.8	0.7	0.6	0.5	0.5
10X	0.5				

Table B3

Speed Profile (mph) for MC3, 4x4, 16.00 R20XS Tires, 435-hp for Federal Republic of Germany Study Area

Dry Normal Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	54.9	54.7	54.5	54.3	54.1
6X	54.0	53.8	53.7	53.5	53.3
7X	52.8	52.0	50.9	49.9	48.6
8X	47.1	45.6	44.2	42.7	41.1
9X	39.6	38.2	37.0	35.8	34.2
10X	32.6				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	54.8
3X	54.5	54.2	54.0	53.8	53.6
4X	53.4	53.2	52.9	52.6	52.3
5X	52.1	51.8	51.5	51.2	50.9
6X	50.6	50.3	49.8	49.2	48.5
7X	47.8	47.0	46.0	44.9	43.8
8X	42.7	41.5	40.2	38.9	37.5
9X	36.2	35.0	33.8	32.5	30.9
10X	29.6				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	34.0	33.0
1X	31.2	30.1	29.3	28.8	28.4
2X	28.1	27.8	27.4	26.7	26.0
3X	25.5	25.0	24.6	24.3	23.9
4X	23.4	23.0	22.7	22.3	22.1
5X	21.8	21.6	21.3	21.2	21.0
6X	20.8	20.7	20.5	20.4	20.3
7X	20.1	20.0	19.8	19.7	19.5
8X	19.4	19.3	19.2	19.1	19.0
9X	18.8	18.7	18.3	17.6	16.7
10X	16.0				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	52.7	50.2	48.4	46.8
1X	44.7	42.6	41.0	39.3	37.7
2X	36.3	35.0	33.9	32.7	31.8
3X	30.9	30.1	29.3	28.6	28.0
4X	27.4	26.8	26.3	25.8	25.3
5X	24.9	24.5	24.1	23.7	23.3
6X	22.9	22.5	22.1	21.7	21.3
7X	20.9	20.5	20.1	19.8	19.4
8X	19.0	18.6	18.1	17.7	17.1
9X	16.2	5.2	2.5	1.7	1.3
10X	1.0				

Wet-Wet Slippery Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	54.9
5X	54.7	54.5	54.3	54.1	53.9
6X	53.7	53.6	53.5	53.3	52.9
7X	52.2	51.2	49.9	48.7	47.1
8X	45.5	43.8	42.2	40.7	39.0
9X	37.4	35.9	34.7	33.4	31.8
10X	30.3				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.6
3X	50.4	50.3	50.1	50.0	49.9
4X	49.8	49.6	49.4	49.2	48.9
5X	48.7	48.5	48.3	48.0	47.8
6X	47.5	47.2	46.8	46.3	45.6
7X	44.9	44.1	43.1	42.0	41.0
8X	39.9	38.7	37.4	36.2	34.9
9X	33.6	32.4	31.3	30.1	28.6
10X	27.3				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	33.8	32.3
1X	30.6	29.6	29.0	28.5	28.1
2X	27.8	27.6	27.2	26.4	25.8
3X	25.3	24.9	24.5	24.1	23.7
4X	23.3	22.9	22.5	22.2	21.9
5X	21.7	21.4	21.2	21.1	20.9
6X	20.7	20.6	20.4	20.3	20.2
7X	20.0	19.9	19.7	19.6	19.5
8X	19.3	19.2	19.1	19.0	18.9
9X	18.8	18.6	18.2	17.5	16.7
10X	15.9				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	43.8	35.8	31.9	29.1	27.2
1X	25.6	24.4	23.5	22.7	22.1
2X	21.5	21.0	20.5	20.1	19.7
3X	19.4	19.0	18.7	18.4	18.1
4X	17.8	17.6	17.3	17.1	16.8
5X	16.6	16.3	16.1	15.8	15.6
6X	15.4	15.2	14.9	14.7	14.5
7X	14.2	13.9	13.6	13.2	12.4
8X	3.9	2.0	1.4	1.1	0.9
9X	0.7	0.7	0.6	0.5	0.5
10X	0.5				

Snow Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	38.0	38.0	38.0
1X	38.0	38.0	37.9	37.9	37.8
2X	37.8	37.8	37.8	37.7	37.7
3X	37.7	37.7	37.7	37.7	37.7
4X	37.6	37.6	37.5	37.4	37.3
5X	37.2	37.0	36.8	36.7	36.5
6X	36.3	36.2	36.1	35.9	35.8
7X	35.7	35.4	35.0	34.6	34.0
8X	33.3	32.5	31.8	31.0	30.1
9X	29.2	28.4	27.7	26.9	25.9
10X	24.9				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	37.5	37.5	37.4	37.3	37.3
1X	37.3	37.3	37.3	37.2	37.2
2X	37.1	37.1	36.9	36.8	36.6
3X	36.4	36.2	36.0	35.7	35.5
4X	35.3	35.1	34.9	34.7	34.5
5X	34.4	34.2	34.1	33.9	33.7
6X	33.6	33.4	33.2	32.8	32.5
7X	32.1	31.6	31.0	30.3	29.7
8X	29.0	28.2	27.3	26.5	25.7
9X	24.8	24.0	23.2	22.4	21.3
10X	20.4				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	32.7	31.4	30.2	29.1
1X	28.3	27.8	27.2	26.7	26.3
2X	25.9	25.6	25.3	24.8	24.3
3X	24.0	23.7	23.4	23.0	22.6
4X	22.2	21.9	21.6	21.4	21.1
5X	20.9	20.8	20.6	20.4	20.3
6X	20.2	20.0	19.9	19.8	19.7
7X	19.5	19.4	19.3	19.1	19.0
8X	18.9	18.8	18.7	18.6	18.5
9X	18.4	18.3	17.9	17.2	16.4
10X	15.7				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	35.0	32.2	31.2	30.4	29.6
1X	28.9	28.2	27.5	26.9	26.3
2X	25.7	25.1	24.6	24.0	23.6
3X	23.1	22.7	22.3	21.9	21.5
4X	21.1	20.8	20.5	20.1	19.8
5X	19.5	19.2	18.9	18.6	18.2
6X	17.9	17.6	17.3	17.0	16.7
7X	16.3	16.0	15.6	15.2	14.7
8X	4.9	2.3	1.5	1.1	0.9
9X	0.8	0.7	0.6	0.5	0.5
10X	0.5				

Table B4

Speed Profile (mph) for MC4, 4x4, 16.00 R20XS Tires, 655-hp for Federal Republic of Germany Study Area

Dry Normal Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	54.8
7X	54.2	53.3	52.2	51.1	49.7
8X	48.1	46.5	45.0	43.5	41.8
9X	40.2	38.8	37.5	36.3	34.6
10X	33.0				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	54.9	54.8
5X	54.7	54.6	54.4	54.2	53.9
6X	53.7	53.4	53.0	52.6	51.9
7X	51.0	50.0	48.8	47.5	46.3
8X	44.9	43.6	42.0	40.6	39.1
9X	37.6	36.2	35.0	33.6	31.9
10X	30.4				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	34.0	33.2
1X	31.3	30.2	29.4	28.9	28.4
2X	28.1	27.9	27.4	26.7	26.0
3X	25.5	25.1	24.7	24.3	23.9
4X	23.5	23.1	22.7	22.4	22.1
5X	21.8	21.6	21.4	21.2	21.0
6X	20.8	20.7	20.5	20.4	20.3
7X	20.1	20.0	19.8	19.7	19.5
8X	19.4	19.3	19.2	19.1	19.0
9X	18.8	18.7	18.3	17.6	16.7
10X	16.0				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	53.8	50.9	49.0
1X	46.5	44.0	42.2	40.3	38.5
2X	37.0	35.6	34.4	33.3	32.3
3X	31.4	30.6	29.8	29.1	28.4
4X	27.8	27.2	26.7	26.2	25.8
5X	25.3	24.9	24.5	24.1	23.7
6X	23.3	22.9	22.5	22.2	21.8
7X	21.4	21.1	20.7	20.3	19.9
8X	19.5	19.1	18.7	18.2	17.6
9X	16.7	5.2	2.5	1.7	1.3
10X	1.0				

Wet-Wet Slippery Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	54.8	54.4
7X	53.6	52.5	51.1	49.8	48.1
8X	46.4	44.6	43.0	41.4	39.6
9X	37.9	36.4	35.1	33.8	32.2
10X	30.6				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.6	50.5	50.4	50.3	50.1
6X	49.9	49.7	49.3	48.9	48.2
7X	47.4	46.5	45.3	44.0	42.8
8X	41.9	40.3	38.8	37.5	36.0
9X	34.6	33.4	32.2	30.9	29.3
10X	28.0				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	34.0	32.9
1X	31.1	30.0	29.2	28.7	28.3
2X	28.0	27.8	27.3	26.6	25.9
3X	25.4	25.0	24.6	24.3	23.8
4X	23.4	23.0	22.6	22.3	22.0
5X	21.8	21.5	21.3	21.1	20.9
6X	20.8	20.6	20.5	20.4	20.3
7X	20.1	19.9	19.8	19.6	19.5
8X	19.4	19.3	19.2	19.1	19.0
9X	18.8	18.7	18.3	17.6	16.7
10X	16.0				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	47.3	38.2	33.8	30.9	28.8
1X	27.1	25.7	24.6	23.8	23.0
2X	22.4	21.8	21.3	20.8	20.4
3X	20.0	19.6	19.3	18.9	18.6
4X	18.3	18.0	17.7	17.4	17.1
5X	16.8	16.6	16.3	16.0	15.7
6X	15.4	15.1	14.8	14.5	14.1
7X	13.4	5.0	2.2	1.4	1.0
8X	0.8	0.7	0.6	0.6	0.5
9X	0.5	0.4	0.4	0.4	0.4
10X	0.3				

Snow Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	48.8	48.8	48.8	48.8	48.8
1X	48.8	48.8	48.8	48.8	48.8
2X	48.8	48.8	48.8	48.8	48.7
3X	48.7	48.7	48.7	48.6	48.6
4X	48.4	48.2	48.0	47.8	47.6
5X	47.4	47.2	47.0	46.8	46.5
6X	46.4	46.2	46.0	45.8	45.6
7X	45.1	44.4	43.5	42.6	41.5
8X	40.2	38.9	37.7	36.4	35.0
9X	33.7	32.5	31.5	30.4	29.0
10X	27.7				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	39.3	39.3	39.3	39.3	39.3
1X	39.3	39.3	39.3	39.3	39.3
2X	39.3	39.3	39.3	39.3	39.2
3X	39.2	39.2	39.1	39.1	39.1
4X	39.0	39.0	38.9	38.8	38.6
5X	38.5	38.4	38.2	38.1	37.9
6X	37.8	37.6	37.3	37.0	36.5
7X	35.9	35.2	34.4	33.5	32.6
8X	31.7	30.7	29.6	28.6	27.6
9X	26.5	25.5	24.7	23.7	22.5
10X	21.4				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	33.5	32.1
1X	30.5	29.6	28.9	28.4	28.1
2X	27.8	27.6	27.2	26.5	25.8
3X	25.3	24.9	24.5	24.1	23.7
4X	23.3	22.9	22.5	22.2	21.9
5X	21.7	21.4	21.2	21.1	20.9
6X	20.7	20.6	20.4	20.3	20.2
7X	20.0	19.9	19.7	19.6	19.5
8X	19.3	19.2	19.1	19.0	18.9
9X	18.8	18.6	18.2	17.5	16.7
10X	15.9				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	42.6	39.5	37.4	36.0	34.8
1X	33.7	32.5	31.5	30.5	29.6
2X	28.7	27.9	27.1	26.4	25.8
3X	25.2	24.6	24.1	23.6	23.1
4X	22.7	22.3	21.9	21.5	21.1
5X	20.7	20.3	20.0	19.7	19.3
6X	18.9	18.6	18.2	17.9	17.5
7X	17.1	16.7	16.3	15.9	15.3
8X	5.1	2.3	1.5	1.1	0.9
9X	0.8	0.7	0.6	0.5	0.5
10X	0.5				

Table B5

Speed Profile (mph) for MC5, 6x6, 14.00 R20XS Tires, 435-hp for Federal Republic of Germany Study Area

Dry Normal Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	54.9	54.7	54.5	54.3	54.1
6X	53.9	53.8	53.6	53.5	53.2
7X	52.7	51.9	50.9	49.9	48.6
8X	47.1	45.6	44.2	42.7	41.1
9X	39.6	38.2	37.0	35.8	34.1
10X	32.6				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	54.9
3X	54.7	54.5	54.3	54.1	53.9
4X	53.6	53.3	53.0	52.7	52.4
5X	52.1	51.7	51.4	51.2	50.8
6X	50.5	50.2	49.7	49.0	48.4
7X	47.7	46.9	45.9	44.8	43.7
8X	42.6	41.4	40.1	38.8	37.5
9X	36.1	34.9	33.7	32.5	30.9
10X	29.5				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	38.0	38.0	36.3
1X	34.0	32.7	31.8	31.1	30.6
2X	30.2	29.9	29.3	28.6	28.0
3X	27.5	27.1	26.7	26.4	25.9
4X	25.5	25.1	24.8	24.5	24.3
5X	24.0	23.8	23.6	23.4	23.3
6X	23.1	23.0	22.9	22.7	22.5
7X	22.4	22.2	22.0	21.9	21.7
8X	21.6	21.5	21.4	21.3	21.1
9X	20.9	20.7	20.1	19.2	18.2
10X	17.3				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	53.5	51.4	49.5	48.0
1X	46.3	44.6	43.0	41.4	39.7
2X	38.0	36.6	35.3	34.2	33.1
3X	32.1	31.2	30.4	29.6	28.9
4X	28.3	27.7	27.1	26.5	26.0
5X	25.5	25.0	24.5	24.0	23.5
6X	23.0	22.5	22.1	21.6	21.2
7X	20.7	20.3	19.8	19.4	19.0
8X	18.5	18.1	17.6	17.1	16.4
9X	15.3	4.8	2.4	1.6	1.2
10X	1.0				

Wet-Wet Slippery Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	54.9
5X	54.7	54.5	54.3	54.1	53.9
6X	53.7	53.6	53.4	53.3	52.9
7X	52.1	51.1	49.8	48.6	47.1
8X	45.4	43.8	42.2	40.7	38.9
9X	37.3	35.9	34.7	33.4	31.8
10X	30.2				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.6
3X	50.5	50.5	50.4	50.2	50.1
4X	50.0	49.7	49.5	49.2	49.0
5X	48.7	48.5	48.2	48.0	47.7
6X	47.4	47.1	46.7	46.1	45.5
7X	44.8	44.0	43.0	41.9	40.9
8X	39.8	38.6	37.3	36.1	34.8
9X	33.5	32.4	31.3	30.1	28.6
10X	27.3				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	38.0	37.1	34.9
1X	33.1	31.9	31.1	30.6	30.2
2X	29.8	29.6	28.9	28.3	27.7
3X	27.2	26.8	26.5	26.1	25.6
4X	25.2	24.9	24.6	24.3	24.0
5X	23.8	23.6	23.4	23.3	23.1
6X	23.0	22.8	22.7	22.5	22.4
7X	22.2	22.0	21.9	21.7	21.6
8X	21.5	21.4	21.2	21.1	21.0
9X	20.8	20.5	20.0	19.1	18.1
10X	17.2				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	44.0	36.5	32.8	30.5	28.7
1X	27.3	26.2	25.2	24.5	23.8
2X	23.1	22.5	22.0	21.5	21.1
3X	20.7	20.3	19.9	19.6	19.2
4X	18.9	18.6	18.3	18.0	17.7
5X	17.4	17.1	16.9	16.6	16.4
6X	16.1	15.8	15.6	15.3	15.0
7X	14.7	14.4	14.1	13.8	13.3
8X	12.6	4.2	2.1	1.4	1.1
9X	0.9	0.8	0.7	0.6	0.5
10X	0.5				

Snow Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	48.8	48.8	48.8	48.8	48.8
1X	48.8	48.8	48.8	48.8	48.8
2X	48.8	48.8	48.8	48.8	48.7
3X	48.6	48.6	48.5	48.4	48.4
4X	48.3	48.1	47.9	47.6	47.4
5X	47.1	46.8	46.5	46.1	45.8
6X	45.5	45.2	45.0	44.8	44.5
7X	44.0	43.4	42.6	41.7	40.6
8X	39.4	38.2	37.0	35.8	34.5
9X	33.2	32.1	31.1	30.1	28.7
10X	27.4				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	39.3	39.3	39.3	39.3	39.3
1X	39.3	39.3	39.3	39.3	39.3
2X	39.3	39.3	39.3	39.3	39.2
3X	39.2	39.1	39.0	38.9	38.7
4X	38.6	38.4	38.2	38.0	37.9
5X	37.7	37.5	37.2	37.0	36.8
6X	36.5	36.3	36.1	35.7	35.2
7X	34.7	34.1	33.3	32.5	31.7
8X	30.8	29.9	28.9	28.0	27.0
9X	26.0	25.1	24.2	23.3	22.1
10X	21.1				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	37.8	36.8	35.5	33.6
1X	32.1	31.1	30.5	30.0	29.5
2X	28.9	28.5	28.0	27.4	26.9
3X	26.5	26.2	25.9	25.5	25.1
4X	24.7	24.4	24.1	23.9	23.7
5X	23.5	23.3	23.1	23.0	22.8
6X	22.7	22.6	22.4	22.3	22.1
7X	21.9	21.8	21.6	21.5	21.4
8X	21.3	21.1	21.0	20.9	20.8
9X	20.6	20.4	19.9	19.0	18.0
10X	17.1				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	44.4	38.8	36.7	35.2	33.9
1X	32.7	31.7	30.8	29.8	29.0
2X	28.2	27.5	26.8	26.1	25.5
3X	25.0	24.4	23.9	23.4	22.9
4X	22.4	22.0	21.5	21.1	20.7
5X	20.3	19.9	19.5	19.1	18.7
6X	18.3	17.9	17.5	17.1	16.8
7X	16.4	15.9	15.5	15.1	14.6
8X	13.6	3.7	2.0	1.4	1.1
9X	0.9	0.8	0.7	0.6	0.5
10X	0.5				

Table B6

Speed Profile (mph) for MC6, 6x6, 14.00 R20XS Tires, 655-hp for Federal Republic of Germany Study Area

Dry Normal Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	54.9	54.9	54.9
6X	54.9	54.9	54.9	54.9	54.6
7X	54.1	53.2	52.1	51.0	49.6
8X	48.0	46.5	45.0	43.4	41.8
9X	40.2	38.8	37.5	36.2	34.5
10X	32.9				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	54.9	54.9	54.9
4X	54.9	54.8	54.8	54.7	54.6
5X	54.5	54.4	54.2	54.0	53.8
6X	53.5	53.2	52.8	52.4	51.6
7X	50.8	49.8	48.6	47.3	46.1
8X	44.8	43.4	41.9	40.5	39.0
9X	37.5	36.1	34.9	33.5	31.8
10X	30.4				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	38.0	38.0	36.6
1X	34.3	32.8	31.9	31.2	30.7
2X	30.3	30.0	29.4	28.6	28.0
3X	27.5	27.1	26.7	26.4	26.0
4X	25.6	25.2	24.9	24.6	24.3
5X	24.1	23.9	23.7	23.5	23.3
6X	23.2	23.0	22.9	22.7	22.6
7X	22.4	22.2	22.0	21.9	21.8
8X	21.6	21.5	21.4	21.3	21.1
9X	20.9	20.7	20.2	19.3	18.2
10X	17.3				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	54.7	53.8	52.1	50.3
1X	48.5	46.4	44.5	42.7	40.8
2X	39.0	37.5	36.1	34.9	33.8
3X	32.8	31.9	31.1	30.3	29.6
4X	28.9	28.3	27.7	27.1	26.6
5X	26.1	25.6	25.1	24.6	24.1
6X	23.6	23.1	22.7	22.2	21.8
7X	21.3	20.9	20.5	20.0	19.6
8X	19.1	18.7	18.2	17.6	17.0
9X	16.0	5.0	2.5	1.6	1.3
10X	1.0				

Wet-Wet Slippery Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	54.9	54.9	54.9	54.9
6X	54.9	54.9	54.9	54.7	54.3
7X	53.4	52.3	51.0	49.7	48.0
8X	46.3	44.5	42.9	41.3	39.5
9X	37.9	36.4	35.1	33.8	32.1
10X	30.5				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.6
5X	50.6	50.5	50.4	50.3	50.1
6X	49.9	49.6	49.2	48.9	48.1
7X	47.3	46.4	45.2	44.0	42.8
8X	41.5	40.2	38.8	37.4	36.0
9X	34.6	33.3	32.2	30.9	29.3
10X	27.9				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	38.0	38.0	36.2
1X	33.9	32.6	31.7	31.1	30.6
2X	30.2	29.9	29.3	28.6	28.0
3X	27.5	27.0	26.7	26.4	25.9
4X	25.5	25.1	24.8	24.5	24.3
5X	24.0	23.8	23.6	23.4	23.3
6X	23.1	23.0	22.9	22.7	22.5
7X	22.4	22.2	22.0	21.9	21.7
8X	21.6	21.5	21.4	21.3	21.1
9X	20.9	20.7	20.1	19.2	18.2
10X	17.3				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.2	39.0	35.6	33.3	31.4
1X	29.8	28.6	27.5	26.6	25.7
2X	25.0	24.2	23.6	22.9	22.4
3X	21.9	21.4	21.0	20.6	20.2
4X	19.8	19.5	19.1	18.8	18.5
5X	18.2	17.9	17.6	17.3	17.0
6X	16.7	16.5	16.2	15.9	15.6
7X	15.3	15.0	14.6	14.3	13.8
8X	12.7	3.4	1.9	1.3	1.0
9X	0.9	0.7	0.7	0.6	0.5
10X	0.5				

Snow Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	48.8	48.8	48.8	48.8	48.8
1X	48.8	48.8	48.8	48.8	48.8
2X	48.8	48.8	48.8	48.8	48.8
3X	48.8	48.8	48.8	48.8	48.8
4X	48.8	48.8	48.8	48.8	48.7
5X	48.6	48.4	48.2	48.0	47.7
6X	47.6	47.4	47.2	47.1	46.8
7X	46.3	45.5	44.5	43.6	42.3
8X	41.0	39.6	38.3	37.0	35.6
9X	34.2	33.0	31.9	30.8	29.4
10X	28.8				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	39.3	39.3	39.3	39.3	39.3
1X	39.3	39.3	39.3	39.3	39.3
2X	39.3	39.3	39.3	39.3	39.3
3X	39.3	39.3	39.3	39.3	39.3
4X	39.3	39.3	39.2	39.2	39.1
5X	39.1	39.0	39.0	38.9	38.9
6X	38.8	38.6	38.3	38.1	37.5
7X	36.9	36.1	35.2	34.2	33.3
8X	32.3	31.3	30.2	29.1	28.0
9X	26.9	25.9	25.0	24.0	22.7
10X	21.7				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	38.0	37.6	35.8
1X	33.7	32.4	31.5	30.9	30.5
2X	30.1	29.8	29.2	28.5	27.9
3X	27.4	27.0	26.6	26.3	25.9
4X	25.5	25.1	24.8	24.5	24.2
5X	24.0	23.8	23.6	23.4	23.3
6X	23.1	23.0	22.8	22.7	22.5
7X	22.3	22.2	22.0	21.9	21.7
8X	21.6	21.5	21.3	21.2	21.1
9X	20.9	20.6	20.1	19.2	18.2
10X	17.3				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	47.6	42.7	40.5	38.8	37.3
1X	36.1	34.8	33.5	32.4	31.3
2X	30.4	29.4	28.5	27.7	27.0
3X	26.4	25.8	25.2	24.6	24.0
4X	23.5	23.0	22.5	22.0	21.6
5X	21.1	20.7	20.2	19.8	19.4
6X	18.9	18.5	18.1	17.7	17.3
7X	16.8	16.4	16.0	15.5	15.0
8X	14.2	3.8	2.0	1.4	1.1
9X	0.9	0.8	0.7	0.6	0.5
10X	0.5				

Table B7

Speed Profile (mph) for MC7, 6x6, 16.00 R20XS Tires, 435-hp for Federal Republic of Germany Study Area

Dry Normal Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	54.9	54.8	54.7
5X	54.5	54.4	54.1	53.9	53.7
6X	53.5	53.3	53.1	52.9	52.6
7X	52.2	51.4	50.4	49.5	48.1
8X	46.7	45.2	43.8	42.4	40.8
9X	39.3	38.0	36.8	35.6	34.0
10X	32.4				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	54.8
3X	54.5	54.3	54.1	53.8	53.5
4X	53.3	53.0	52.7	52.3	52.0
5X	51.7	51.4	51.1	50.8	50.5
6X	50.2	49.8	49.3	48.7	48.0
7X	47.4	46.6	45.6	44.5	43.5
8X	42.4	41.2	39.9	38.6	37.3
9X	36.0	34.8	33.6	32.4	30.8
10X	29.4				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	38.0	38.0	36.3
1X	34.0	32.6	31.7	31.1	30.6
2X	30.2	29.9	29.3	28.6	28.0
3X	27.5	27.1	26.7	26.4	25.9
4X	25.5	25.1	24.8	24.5	24.3
5X	24.0	23.8	23.6	23.4	23.3
6X	23.1	23.0	22.9	22.7	22.5
7X	22.4	22.2	22.0	21.9	21.7
8X	21.6	21.5	21.4	21.3	21.1
9X	20.9	20.7	20.1	19.2	18.2
10X	17.3				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	52.9	50.9	49.1	47.6
1X	46.0	44.3	42.8	41.2	39.5
2X	37.8	36.5	35.2	34.1	33.0
3X	32.1	31.2	30.3	29.6	28.9
4X	28.2	27.6	27.0	26.5	26.0
5X	25.5	25.0	24.5	24.0	23.4
6X	22.9	22.5	22.0	21.6	21.1
7X	20.7	20.2	19.8	19.4	18.9
8X	18.5	18.0	17.5	17.0	16.3
9X	15.4	6.6	2.8	1.8	1.3
10X	1.1				

Wet-Wet Slippery Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	54.9	54.8	54.7	54.5
5X	54.4	54.1	53.9	53.6	53.4
6X	53.2	53.0	52.9	52.7	52.3
7X	51.6	50.6	49.4	48.2	46.7
8X	45.1	43.4	41.9	40.4	38.7
9X	37.1	35.7	34.5	33.3	31.7
10X	30.1				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.6
3X	50.5	50.3	50.2	50.0	49.8
4X	49.6	49.4	49.2	48.9	48.7
5X	48.5	48.2	47.9	47.7	47.4
6X	47.1	46.8	46.4	45.8	45.2
7X	44.5	43.7	42.7	41.7	40.7
8X	39.6	38.4	37.1	35.9	34.7
9X	33.4	32.2	31.2	30.0	28.5
10X	27.2				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	37.8	37.0	34.9
1X	33.0	31.9	31.1	30.6	30.2
2X	29.8	29.6	28.9	28.3	27.7
3X	27.2	26.8	26.5	26.0	25.6
4X	25.2	24.9	24.5	24.3	24.0
5X	23.8	23.6	23.4	23.3	23.1
6X	23.0	22.8	22.7	22.5	22.4
7X	22.2	22.0	21.9	21.7	21.6
8X	21.5	21.3	21.2	21.1	21.0
9X	20.8	20.5	20.0	19.1	18.1
10X	17.2				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	43.6	36.2	33.0	31.2	29.5
1X	28.1	27.0	26.1	25.3	24.6
2X	24.0	23.3	22.7	22.2	21.7
3X	21.3	20.9	20.5	20.1	19.7
4X	19.4	19.1	18.8	18.5	18.2
5X	17.9	17.6	17.3	17.1	16.8
6X	16.5	16.2	15.9	15.7	15.4
7X	15.1	14.8	14.5	14.1	13.8
8X	13.3	12.2	3.7	2.0	1.4
9X	1.1	0.9	0.8	0.7	0.6
10X	0.5				

Snow Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.9	45.9	45.9	45.9	45.9
1X	45.9	45.9	45.9	45.8	45.8
2X	45.8	45.8	45.8	45.7	45.7
3X	45.7	45.7	45.7	45.7	45.7
4X	45.7	45.6	45.4	45.2	45.1
5X	44.9	44.6	44.3	44.1	43.8
6X	43.6	43.3	43.1	43.0	42.7
7X	42.4	41.8	41.1	40.4	39.4
8X	38.3	37.1	36.0	34.9	33.7
9X	32.5	31.4	30.5	29.5	28.2
10X	27.0				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	39.3	39.3	39.3	39.3	39.3
1X	39.3	39.3	39.3	39.3	39.3
2X	39.3	39.3	39.3	39.3	39.2
3X	39.1	39.1	39.0	38.8	38.7
4X	38.5	38.3	38.1	37.9	37.6
5X	37.4	37.2	37.0	36.8	36.6
6X	36.4	36.2	35.9	35.5	35.0
7X	34.5	33.9	33.1	32.3	31.5
8X	30.7	29.8	28.8	27.9	26.9
9X	25.9	25.0	24.2	23.2	22.1
10X	21.1				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	37.8	36.7	34.9	33.1
1X	31.7	30.9	30.3	29.8	29.3
2X	28.8	28.5	27.9	27.4	26.9
3X	26.5	26.2	25.9	25.4	25.0
4X	24.7	24.4	24.1	23.9	23.6
5X	23.4	23.3	23.1	22.9	22.8
6X	22.7	22.6	22.4	22.2	22.1
7X	21.9	21.7	21.6	21.5	21.3
8X	21.2	21.1	21.0	20.9	20.8
9X	20.5	20.3	19.8	19.0	17.9
10X	17.1				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	43.5	38.3	36.1	34.7	33.5
1X	32.4	31.4	30.5	29.7	28.8
2X	28.1	27.4	26.7	26.0	25.5
3X	24.9	24.4	23.8	23.3	22.9
4X	22.4	21.9	21.5	21.1	20.6
5X	20.2	19.8	19.4	19.1	18.7
6X	18.3	17.9	17.5	17.1	16.7
7X	16.3	15.9	15.5	15.1	14.6
8X	13.8	4.5	2.2	1.5	1.1
9X	0.9	0.8	0.7	0.6	0.6
10X	0.5				

Table B8

Speed Profile (mph) for MC8, 6x6, 16.00 R20XS Tires, 655-hp for Federal Republic of Germany Study Area

Dry Normal Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	54.7
7X	54.2	53.3	52.2	51.1	49.7
8X	48.1	46.5	45.0	43.5	41.8
9X	40.2	38.8	37.5	36.2	34.6
10X	33.0				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	54.9	54.8	54.6
5X	54.5	54.3	54.0	53.8	53.6
6X	53.3	53.0	52.7	52.2	51.5
7X	50.7	49.7	48.5	47.2	46.0
8X	44.7	43.3	41.8	40.4	38.9
9X	37.4	36.1	34.9	33.5	31.8
10X	30.3				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	38.0	38.0	36.6
1X	34.3	32.8	31.9	31.2	30.7
2X	30.3	30.0	29.4	28.7	28.0
3X	27.5	27.1	26.7	26.4	26.0
4X	25.6	25.2	24.9	24.6	24.3
5X	24.1	23.9	23.7	23.5	23.3
6X	23.2	23.0	22.9	22.7	22.6
7X	22.4	22.2	22.0	21.9	21.8
8X	21.6	21.5	21.4	21.3	21.1
9X	20.9	20.7	20.2	19.3	18.2
10X	17.3				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	54.1	52.2	50.3
1X	48.5	46.4	44.6	42.7	40.8
2X	39.0	37.5	36.1	34.9	33.8
3X	32.8	31.9	31.0	30.3	29.5
4X	28.9	28.2	27.6	27.1	26.6
5X	26.0	25.5	25.1	24.6	24.1
6X	23.6	23.1	22.6	22.2	21.7
7X	21.3	20.9	20.4	20.0	19.5
8X	19.0	18.6	18.1	17.5	16.9
9X	16.0	6.8	2.8	1.8	1.3
10X	1.1				

Wet-Wet Slippery Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	54.8	54.3
7X	53.5	52.4	51.0	49.7	48.1
8X	46.3	44.6	43.0	41.3	39.6
9X	37.9	36.4	35.1	33.8	32.2
10X	30.6				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.6	50.6
5X	50.5	50.3	50.2	50.0	49.8
6X	49.7	49.4	49.0	48.7	48.0
7X	47.2	46.2	45.0	43.8	42.6
8X	41.4	40.1	38.7	37.3	35.9
9X	34.5	33.3	32.1	30.8	29.3
10X	27.9				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	38.0	38.0	36.3
1X	34.0	32.6	31.7	31.1	30.6
2X	30.2	29.9	29.3	28.6	28.0
3X	27.5	27.1	26.7	26.4	25.9
4X	25.5	25.2	24.8	24.5	24.3
5X	24.0	23.8	23.6	23.5	23.3
6X	23.1	23.0	22.9	22.7	22.5
7X	22.4	22.2	22.0	21.9	21.7
8X	21.6	21.5	21.4	21.3	21.1
9X	20.9	20.7	20.1	19.2	18.2
10X	17.3				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	49.8	39.8	36.6	34.3	32.3
1X	30.7	29.5	28.4	27.4	26.5
2X	25.7	24.9	24.2	23.5	23.0
3X	22.4	22.0	21.5	21.1	20.7
4X	20.3	19.9	19.6	19.2	18.9
5X	18.6	18.3	18.0	17.7	17.4
6X	17.1	16.8	16.5	16.2	15.9
7X	15.6	15.3	15.0	14.7	14.3
8X	13.9	12.9	3.5	2.0	1.4
9X	1.1	0.9	0.8	0.7	0.6
10X	0.5				

Snow Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	48.8	48.8	48.8	48.8	48.8
1X	48.8	48.8	48.8	48.8	48.8
2X	48.8	48.8	48.8	48.8	48.8
3X	48.8	48.8	48.8	48.8	48.8
4X	48.8	48.8	48.8	48.8	48.7
5X	48.5	48.3	48.1	47.9	47.8
6X	47.6	47.4	47.3	47.2	46.9
7X	46.4	45.6	44.6	43.7	42.4
8X	41.1	39.7	38.4	37.1	35.6
9X	34.2	33.0	31.9	30.8	29.4
10X	28.0				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	39.3	39.3	39.3	39.3	39.3
1X	39.3	39.3	39.3	39.3	39.3
2X	39.3	39.3	39.3	39.3	39.3
3X	39.3	39.3	39.3	39.3	39.3
4X	39.3	39.2	39.2	39.2	39.2
5X	39.2	39.1	39.1	39.0	39.0
6X	38.9	38.7	38.4	38.1	37.5
7X	36.9	36.1	35.2	34.2	33.3
8X	32.3	31.3	30.2	29.1	28.0
9X	26.9	25.9	25.0	24.0	22.7
10X	21.7				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	37.9	37.6	35.9
1X	33.7	32.4	31.6	30.9	30.5
2X	30.1	29.8	29.2	28.5	27.9
3X	27.4	27.0	26.6	26.3	25.9
4X	25.4	25.1	24.8	24.5	24.2
5X	24.0	23.8	23.6	23.4	23.2
6X	23.1	23.0	22.8	22.7	22.5
7X	22.3	22.2	22.0	21.8	21.7
8X	21.6	21.5	21.3	21.2	21.1
9X	20.9	20.6	20.1	19.2	18.2
10X	17.3				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	47.7	42.7	40.7	38.8	37.4
1X	36.2	34.9	33.5	32.4	31.4
2X	30.4	29.5	28.6	27.8	27.0
3X	26.4	25.8	25.2	24.6	24.0
4X	23.5	23.0	22.5	22.0	21.6
5X	21.1	20.7	20.2	19.8	19.4
6X	18.9	18.5	18.1	17.7	17.3
7X	16.9	16.4	16.0	15.5	15.0
8X	14.4	4.8	2.3	1.5	1.1
9X	0.9	0.8	0.7	0.6	0.6
10X	0.5				

Table B9

Speed Profile (mph) for MC9, 8x8, 14.00 R20XS Tires, 435-hp for Federal Republic of Germany Study Area

Dry Normal Condition

	Primary Roads					Secondary Roads					Trails					Off Road				
	PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	45.0	45.0	45.0	44.8	42.7	55.0	53.4	51.4	49.4	48.0
1X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	41.0	40.0	39.3	38.8	38.4	46.6	45.0	43.5	42.0	40.7
2X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.8	38.1	37.5	36.4	35.6	34.9	39.5	38.2	37.0	35.9	35.0
3X	55.0	55.0	55.0	55.0	55.0	54.6	54.4	54.2	54.0	53.7	34.3	33.8	33.1	32.3	31.6	34.0	33.2	32.4	31.6	30.9
4X	55.0	55.0	55.0	55.0	55.0	53.5	53.1	52.8	52.4	52.1	31.0	30.4	30.0	29.5	29.2	30.2	29.5	28.9	28.3	27.7
5X	54.8	54.6	54.4	54.1	53.9	51.8	51.5	51.2	50.9	50.5	28.8	28.5	28.2	28.0	27.7	27.1	26.5	25.9	25.3	24.7
6X	53.7	53.5	53.3	53.2	52.9	50.2	49.8	49.3	48.6	48.0	27.5	27.3	27.1	26.9	26.5	24.2	23.7	23.1	22.6	22.1
7X	52.4	51.6	50.6	49.6	48.3	47.3	46.6	45.5	44.5	43.4	26.2	25.9	25.7	25.4	25.2	21.6	21.1	20.7	20.2	19.7
8X	46.9	45.4	44.0	42.5	40.9	42.3	41.2	39.8	38.6	37.3	25.0	24.8	24.6	24.4	24.2	19.2	18.7	18.2	17.5	16.7
9X	39.4	38.1	36.9	35.7	34.0	35.9	34.7	33.6	32.3	30.8	23.8	23.4	22.7	21.5	20.1	15.1	4.0	2.2	1.5	1.2
10X	32.5					29.4					19.0					1.0				

Wet-Wet Slippery Condition

	Primary Roads					Secondary Roads					Trails					Off Road				
	PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	45.0	44.8	43.9	42.0	40.2	43.4	36.8	33.5	31.6	30.2
1X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	39.2	38.5	37.9	37.3	36.8	29.0	27.9	27.0	26.2	25.5
2X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.6	36.3	35.6	34.8	34.1	33.6	24.8	24.2	23.6	23.0	22.5
3X	55.0	55.0	55.0	55.0	55.0	50.5	50.4	50.3	50.2	50.0	33.1	32.6	31.8	31.2	30.5	22.0	21.5	21.1	20.7	20.3
4X	55.0	55.0	55.0	55.0	54.8	49.8	49.6	49.3	49.0	48.8	30.0	29.5	29.1	28.8	28.4	19.9	19.6	19.3	18.9	18.6
5X	54.6	54.4	54.1	53.9	53.7	48.5	48.2	48.0	47.7	47.4	28.1	27.9	27.6	27.4	27.2	18.3	18.0	17.7	17.5	17.2
6X	53.5	53.3	53.1	53.0	52.5	47.1	46.8	46.4	45.8	45.1	27.0	26.8	26.6	26.3	26.0	16.9	16.6	16.3	16.0	15.7
7X	51.8	50.8	49.6	48.4	46.9	44.5	43.7	42.7	41.7	40.6	25.7	25.5	25.2	25.0	24.8	15.4	15.1	14.7	14.4	14.0
8X	45.2	43.6	42.0	40.5	38.8	39.5	38.4	37.1	35.9	34.6	24.6	24.4	24.3	24.1	23.8	13.4	10.9	3.1	1.8	1.3
9X	37.2	35.8	34.6	33.3	31.7	33.4	32.2	31.2	30.0	28.5	23.4	23.1	22.4	21.2	19.9	1.0	0.9	0.7	0.7	0.6
10X	30.2					27.2					18.8					0.5				

Snow Condition

	Primary Roads					Secondary Roads					Trails					Off Road				
	PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8
X	48.9	48.9	48.9	48.9	48.9	39.3	39.3	39.3	39.3	39.3	45.0	44.8	43.5	41.5	39.9	46.5	41.2	38.8	37.1	35.8
1X	48.9	48.9	48.9	48.9	48.9	39.3	39.3	39.3	39.3	39.3	38.9	38.3	37.6	37.0	36.3	34.6	33.6	32.7	31.9	31.1
2X	48.9	48.9	48.9	48.9	48.9	39.3	39.3	39.3	39.3	39.3	35.8	35.1	34.4	33.8	33.3	30.3	29.5	28.8	28.1	27.4
3X	48.9	48.9	48.9	48.9	48.9	39.3	39.3	39.3	39.2	39.2	32.8	32.3	31.6	30.9	30.3	26.7	26.1	25.5	24.9	24.3
4X	48.8	48.7	48.6	48.5	48.4	39.1	39.0	38.9	38.7	38.6	29.8	29.4	29.0	28.6	28.3	23.8	23.2	22.7	22.2	21.7
5X	48.2	47.9	47.6	47.3	47.1	38.5	38.3	38.1	38.0	37.8	28.0	27.7	27.5	27.3	27.1	21.3	20.8	20.4	20.0	19.5
6X	46.8	46.6	46.4	46.2	45.9	37.6	37.3	37.1	36.7	36.2	26.9	26.7	26.5	26.2	25.9	19.1	18.7	18.2	17.8	17.4
7X	45.4	44.7	43.8	42.9	41.7	35.6	34.9	34.1	33.2	32.3	25.7	25.4	25.2	25.0	24.7	17.0	16.6	16.1	15.7	15.1
8X	40.4	39.1	37.8	36.6	35.2	31.4	30.5	29.4	28.4	27.4	24.6	24.4	24.2	24.0	23.8	14.4	4.4	2.2	1.5	1.1
9X	33.8	32.7	31.6	30.5	29.1	26.4	25.4	24.5	23.6	22.4	23.4	23.1	22.4	21.2	19.9	0.9	0.8	0.7	0.6	0.5
10X	27.8					21.3					18.8					0.5				

Table B10

Speed Profile (mph) for MC10, 8x8, 14.00 R20XS Tires, 655-hp for Federal Republic of Germany Study Area

Dry Normal Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	54.9	54.9	54.9
6X	54.9	54.8	54.8	54.8	54.6
7X	54.0	53.2	52.0	51.0	49.5
8X	48.0	46.4	44.9	43.4	41.7
9X	40.1	38.7	37.5	36.2	34.5
10X	32.9				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	54.9	54.9	54.9
4X	54.9	54.8	54.8	54.6	54.5
5X	54.4	54.2	54.0	53.7	53.5
6X	53.2	52.9	52.6	52.1	51.4
7X	50.6	49.6	48.4	47.1	45.9
8X	44.6	43.3	41.7	40.3	38.9
9X	37.4	36.0	34.8	33.4	31.8
10X	30.3				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	45.0	45.0	45.0	43.3
1X	41.5	40.4	39.6	39.0	38.6
2X	38.3	37.7	36.6	35.8	35.1
3X	34.5	33.9	33.5	32.7	31.9
4X	31.3	30.7	30.2	29.8	29.4
5X	29.0	28.7	28.4	28.1	27.9
6X	27.7	27.5	27.3	27.0	26.7
7X	26.4	26.1	25.8	25.6	25.3
8X	25.1	24.9	24.7	24.5	24.2
9X	23.9	23.5	22.8	21.6	20.2
10X	19.0				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	54.6	53.8	52.3	50.5
1X	49.0	47.2	45.3	43.7	42.2
2X	40.8	39.5	38.2	37.0	36.0
3X	35.0	34.1	33.3	32.5	31.8
4X	31.1	30.4	29.8	29.1	28.5
5X	27.9	27.3	26.7	26.1	25.6
6X	25.0	24.4	23.9	23.4	22.9
7X	22.4	21.9	21.4	20.9	20.4
8X	19.9	19.4	18.8	18.2	17.4
9X	15.8	4.1	2.2	1.5	1.2
10X	1.0				

Wet-Wet Slippery Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	54.9	54.9	54.9	54.9
6X	54.8	54.8	54.8	54.6	54.2
7X	53.4	52.3	50.9	49.6	48.0
8X	46.3	44.5	42.9	41.3	39.5
9X	37.8	36.4	35.1	33.8	32.1
10X	30.5				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.6	50.6
5X	50.5	50.4	50.2	50.1	49.9
6X	49.7	49.4	49.0	48.6	47.9
7X	47.1	46.2	45.0	43.8	42.6
8X	41.4	40.1	38.6	37.3	35.9
9X	34.5	33.3	32.1	30.8	29.3
10X	27.9				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	45.0	45.0	44.4	42.2
1X	40.7	39.7	39.0	38.6	38.2
2X	37.9	37.2	36.2	35.4	34.7
3X	34.2	33.7	33.1	32.3	31.6
4X	31.0	30.4	29.9	29.5	29.1
5X	28.8	28.5	28.2	28.0	27.7
6X	27.5	27.3	27.1	26.9	26.5
7X	26.2	25.9	25.7	25.4	25.2
8X	25.0	24.8	24.6	24.4	24.2
9X	23.8	23.4	22.7	21.5	20.1
10X	19.0				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	49.4	40.1	37.1	35.1	33.4
1X	31.9	30.8	29.7	28.7	27.8
2X	26.9	26.2	25.5	24.7	24.1
3X	23.5	22.9	22.3	21.9	21.4
4X	21.0	20.6	20.2	19.8	19.5
5X	19.1	18.8	18.5	18.2	17.9
6X	17.6	17.3	16.9	16.6	16.3
7X	16.0	15.7	15.4	15.0	14.6
8X	14.1	9.7	2.9	1.8	1.3
9X	1.0	0.8	0.7	0.6	0.6
10X	0.5				

Snow Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	48.9	48.9	48.9	48.9	48.9
1X	48.9	48.9	48.9	48.9	48.9
2X	48.9	48.9	48.9	48.9	48.9
3X	48.9	48.9	48.9	48.9	48.9
4X	48.9	48.9	48.9	48.8	48.8
5X	48.8	48.7	48.6	48.5	48.4
6X	48.3	48.2	48.1	48.0	47.8
7X	47.2	46.4	45.3	44.3	43.0
8X	41.6	40.2	38.8	37.5	36.0
9X	34.6	33.3	32.2	31.1	29.6
10X	28.2				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	39.3	39.3	39.3	39.3	39.3
1X	39.3	39.3	39.3	39.3	39.3
2X	39.3	39.3	39.3	39.3	39.3
3X	39.3	39.3	39.3	39.3	39.3
4X	39.3	39.3	39.3	39.3	39.3
5X	39.2	39.2	39.2	39.1	39.1
6X	39.0	38.9	38.6	38.3	37.8
7X	37.1	36.4	35.4	34.4	33.5
8X	32.5	31.4	30.3	29.2	28.1
9X	27.0	26.0	25.1	24.1	22.8
10X	21.7				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	45.0	45.0	43.9	41.9
1X	40.4	39.5	38.9	38.[illegible]	38.0
2X	37.6	37.0	36.1	35.2	34.6
3X	34.0	33.6	33.0	32.2	31.5
4X	30.9	30.4	29.9	29.5	29.1
5X	28.8	28.5	28.2	27.9	27.7
6X	27.5	27.3	27.1	26.8	26.5
7X	26.2	25.9	25.7	25.4	25.2
8X	25.0	24.8	24.6	24.4	24.1
9X	23.8	23.4	22.7	21.5	20.1
10X	19.0				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	48.6	43.8	41.8	39.9	38.3
1X	37.1	36.1	35.1	34.0	33.0
2X	32.0	31.1	30.2	29.4	28.6
3X	27.9	27.3	26.6	25.9	25.3
4X	24.7	24.1	23.6	23.0	22.5
5X	22.0	21.5	21.0	20.6	20.1
6X	19.7	19.2	18.8	18.3	17.9
7X	17.4	17.0	16.6	16.1	15.6
8X	14.8	4.6	2.2	1.5	1.1
9X	0.9	0.8	0.7	0.6	0.6
10X	0.5				

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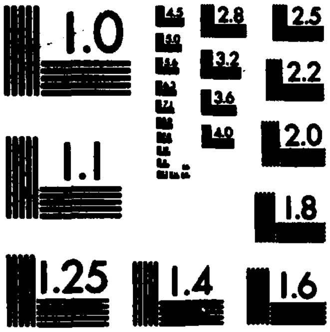
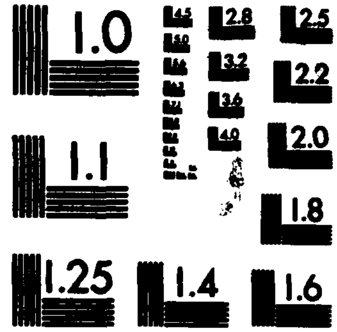


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



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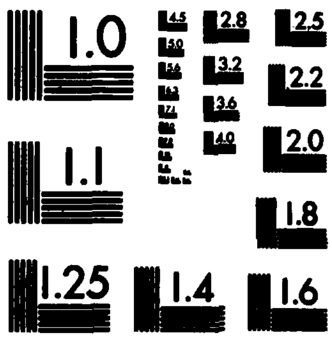
NATIONAL BUREAU OF STANDARDS-1963-A



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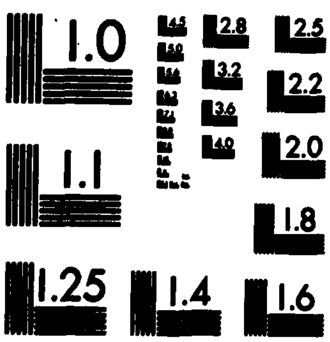
NATIONAL BUREAU OF STANDARDS-1963-A



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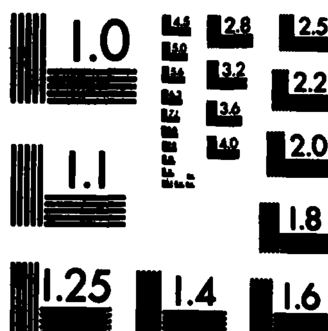

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Table B11

Speed Profile (mph) for MC11, 8x8, 16.00 R20XS Tires, 435-hp for Federal Republic of Germany Study Area

Dry Normal Condition

Primary Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	54.8	54.6	54.4
5X	54.3	54.0	53.7	53.4	53.2
6X	53.0	52.7	52.5	52.4	52.1
7X	51.6	50.9	49.9	49.0	47.7
8X	46.3	44.9	43.5	42.1	40.6
9X	39.1	37.8	36.6	35.4	33.8
10X	32.3				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	54.7	54.4	54.2
3X	53.9	53.7	53.4	53.2	52.8
4X	52.5	52.2	51.9	51.5	51.1
5X	50.8	50.5	50.1	49.8	49.4
6X	49.0	48.6	48.1	47.5	46.9
7X	46.2	45.4	44.5	43.5	42.5
8X	41.5	40.4	39.1	37.9	36.7
9X	35.4	34.2	33.1	31.9	30.4
10X	29.1				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	45.0	44.9	44.2	42.2
1X	40.7	39.7	39.0	38.6	38.2
2X	37.9	37.3	36.3	35.4	34.8
3X	34.2	33.7	33.0	32.2	31.5
4X	30.9	30.4	29.9	29.5	29.1
5X	28.7	28.4	28.2	27.9	27.7
6X	27.5	27.3	27.1	26.8	26.5
7X	26.2	25.9	25.6	25.4	25.2
8X	25.0	24.8	24.6	24.4	24.1
9X	23.7	23.4	22.7	21.5	20.1
10X	19.0				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	52.5	50.3	48.6	47.1
1X	45.7	44.3	42.8	41.4	40.2
2X	39.0	37.8	36.6	35.6	34.6
3X	33.7	32.9	32.1	31.4	30.7
4X	30.0	29.3	28.7	28.1	27.5
5X	26.9	26.3	25.7	25.2	24.6
6X	24.0	23.5	23.0	22.5	22.0
7X	21.5	21.0	20.5	20.0	19.5
8X	19.1	18.6	18.0	17.4	16.6
9X	15.6	6.7	2.8	1.8	1.3
10X	1.1				

Wet-Wet Slippery Condition

Primary Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	54.8	54.6	54.4	54.3
5X	54.0	53.7	53.5	53.2	53.0
6X	52.7	52.5	52.3	52.2	51.8
7X	51.1	50.1	48.9	47.8	46.3
8X	44.7	43.1	41.6	40.1	38.5
9X	36.9	35.5	34.3	33.1	31.5
10X	30.0				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.6	50.4	50.3
3X	50.1	50.0	49.8	49.6	49.4
4X	49.2	48.9	48.6	48.3	48.0
5X	47.7	47.4	47.1	46.9	46.5
6X	46.2	45.8	45.4	44.8	44.2
7X	43.5	42.8	41.8	40.9	39.9
8X	38.9	37.8	36.5	35.4	34.2
9X	32.9	31.8	30.8	29.6	28.2
10X	27.0				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	44.7	43.3	41.2	39.6
1X	38.7	38.1	37.5	36.9	36.2
2X	35.7	35.0	34.3	33.7	33.2
3X	32.8	32.3	31.5	30.8	30.3
4X	29.7	29.3	28.9	28.5	28.2
5X	27.9	27.7	27.5	27.2	27.0
6X	26.9	26.7	26.5	26.2	25.9
7X	25.6	25.3	25.1	24.9	24.7
8X	24.5	24.3	24.1	24.0	23.7
9X	23.3	23.0	22.3	21.2	19.9
10X	18.7				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	43.0	35.7	33.0	31.2	30.0
1X	28.8	27.8	26.9	26.1	25.4
2X	24.7	24.1	23.5	22.9	22.3
3X	21.9	21.4	20.9	20.5	20.2
4X	19.8	19.5	19.2	18.9	18.5
5X	18.3	18.0	17.7	17.4	17.1
6X	16.8	16.5	16.2	15.9	15.6
7X	15.3	15.0	14.7	14.4	14.0
8X	13.5	12.7	4.5	2.2	1.5
9X	1.1	0.9	0.8	0.7	0.6
10X	0.6				

Snow Condition

Primary Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	48.9	48.9	48.9	48.9	48.9
1X	48.9	48.9	48.9	48.9	48.9
2X	48.9	48.9	48.9	48.9	48.9
3X	48.9	48.9	48.9	48.9	48.9
4X	48.8	48.7	48.5	48.3	48.1
5X	47.9	47.6	47.2	46.9	46.6
6X	46.3	46.0	45.8	45.6	45.3
7X	44.8	44.1	43.2	42.4	41.2
8X	40.0	38.7	37.5	36.2	34.9
9X	33.6	32.4	31.4	30.3	29.0
10X	27.6				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	39.3	39.3	39.3	39.3	39.3
1X	39.3	39.3	39.3	39.3	39.3
2X	39.3	39.3	39.3	39.3	39.3
3X	39.3	39.3	39.2	39.2	39.0
4X	38.9	38.8	38.6	38.5	38.3
5X	38.1	37.9	37.6	37.4	37.2
6X	37.0	36.8	36.5	36.1	35.6
7X	35.0	34.4	33.6	32.7	31.9
8X	31.0	30.1	29.1	28.1	27.1
9X	26.1	25.2	24.3	23.4	22.2
10X	21.2				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	43.9	42.4	40.4	39.1
1X	38.3	37.8	37.0	36.3	35.5
2X	34.8	34.1	33.5	33.0	32.6
3X	32.2	31.7	31.0	30.4	29.8
4X	29.3	28.9	28.6	28.2	27.9
5X	27.7	27.4	27.2	27.0	26.8
6X	26.6	26.5	26.2	25.9	25.7
7X	25.4	25.2	24.9	24.7	24.5
8X	24.4	24.2	24.0	23.8	23.6
9X	23.2	22.9	22.2	21.1	19.8
10X	18.7				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.3	40.4	37.8	36.3	35.0
1X	33.9	32.9	32.0	31.2	30.5
2X	29.7	29.0	28.3	27.6	27.0
3X	26.4	25.8	25.2	24.6	24.0
4X	23.5	23.0	22.5	22.0	21.5
5X	21.1	20.6	20.2	19.8	19.3
6X	18.9	18.5	18.1	17.7	17.2
7X	16.8	16.4	15.9	15.5	14.9
8X	14.2	8.3	2.8	1.7	1.3
9X	1.0	0.8	0.7	0.6	0.6
10X	0.5				

Table B12

Speed Profile (mph) for MC12, 8x8, 16.00 R20XS Tires, 655-hp for Federal Republic of Germany Study Area

Dry Normal Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	54.9	54.9
6X	54.9	54.8	54.8	54.8	54.5
7X	54.0	53.1	52.0	50.9	49.5
8X	48.0	46.4	44.9	43.4	41.7
9X	40.1	38.7	37.5	36.2	34.5
10X	32.9				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	54.9	54.8	54.7	54.4	54.2
5X	53.9	53.7	53.4	53.2	53.0
6X	52.7	52.4	52.1	51.6	50.9
7X	50.1	49.1	48.0	46.7	45.5
8X	44.3	43.0	41.5	40.1	38.6
9X	37.2	35.9	34.6	33.3	31.6
10X	30.2				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	45.0	45.0	45.0	43.3
1X	41.5	40.3	39.6	39.0	38.6
2X	38.2	37.7	36.6	35.8	35.0
3X	34.4	33.9	33.5	32.7	31.9
4X	31.3	30.7	30.2	29.8	29.4
5X	29.0	28.7	28.4	28.1	27.9
6X	27.7	27.5	27.3	27.0	26.7
7X	26.4	26.1	25.8	25.6	25.3
8X	25.1	24.9	24.7	24.5	24.2
9X	23.9	23.5	22.8	21.6	20.2
10X	19.0				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	53.9	52.0	50.2
1X	48.7	46.9	45.1	43.5	42.0
2X	40.7	39.4	38.1	36.9	35.9
3X	34.9	34.0	33.1	32.3	31.6
4X	30.9	30.3	29.6	29.0	28.3
5X	27.7	27.1	26.6	26.0	25.4
6X	24.9	24.3	23.8	23.3	22.8
7X	22.3	21.8	21.3	20.8	20.2
8X	19.7	19.2	18.6	18.0	17.2
9X	16.1	6.8	2.8	1.8	1.3
10X	1.1				

Wet-Wet Slippery Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	54.9	54.9	54.9	54.8
6X	54.8	54.8	54.7	54.6	54.1
7X	53.3	52.2	50.9	49.6	48.0
8X	46.2	44.5	42.9	41.2	39.5
9X	37.8	36.4	35.1	33.8	32.1
10X	30.5				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.6	50.6	50.4	50.2
5X	50.1	49.9	49.7	49.6	49.4
6X	49.2	48.9	48.6	48.2	47.4
7X	46.7	45.8	44.6	43.5	42.3
8X	41.1	39.8	38.4	37.1	35.7
9X	34.3	33.1	32.0	30.7	29.1
10X	27.8				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	45.0	45.0	43.7	41.7
1X	40.3	39.4	38.8	38.3	37.9
2X	37.6	37.0	36.0	35.2	34.5
3X	34.0	33.5	32.9	32.1	31.4
4X	30.8	30.3	29.8	29.4	29.0
5X	28.7	28.4	28.1	27.9	27.7
6X	27.4	27.3	27.1	26.8	26.5
7X	26.2	25.9	25.6	25.4	25.2
8X	25.0	24.8	24.6	24.4	24.1
9X	23.7	23.4	22.7	21.5	20.1
10X	19.0				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	48.5	40.0	37.0	35.1	33.3
1X	32.0	30.8	29.7	28.7	27.8
2X	26.9	26.2	25.5	24.8	24.1
3X	23.5	22.9	22.4	21.9	21.4
4X	21.0	20.6	20.3	19.9	19.5
5X	19.2	18.9	18.5	18.2	17.9
6X	17.6	17.3	17.0	16.6	16.3
7X	16.0	15.7	15.4	15.0	14.6
8X	14.2	13.4	4.7	2.3	1.5
9X	1.2	0.9	0.8	0.7	0.6
10X	0.6				

Snow Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	48.9	48.9	48.9	48.9	48.9
1X	48.9	48.9	48.9	48.9	48.9
2X	48.9	48.9	48.9	48.9	48.9
3X	48.9	48.9	48.9	48.9	48.9
4X	48.9	48.9	48.9	48.9	48.8
5X	48.7	48.6	48.4	48.2	48.1
6X	47.9	47.7	47.6	47.5	47.2
7X	46.7	45.9	44.9	43.9	42.6
8X	41.3	39.9	38.5	37.2	35.7
9X	34.4	33.1	32.0	30.9	29.5
10X	28.1				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	39.3	39.3	39.3	39.3	39.3
1X	39.3	39.3	39.3	39.3	39.3
2X	39.3	39.3	39.3	39.3	39.3
3X	39.3	39.3	39.3	39.3	39.3
4X	39.3	39.3	39.3	39.3	39.2
5X	39.2	39.2	39.2	39.1	39.1
6X	39.0	38.8	38.5	38.3	37.7
7X	37.0	36.3	35.3	34.4	33.4
8X	32.4	31.4	30.2	29.2	28.1
9X	27.0	26.0	25.0	24.0	22.8
10X	21.7				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	45.0	44.8	43.7	41.7
1X	40.3	39.4	38.8	38.4	38.0
2X	37.7	37.1	36.1	35.3	34.6
3X	34.1	33.6	32.9	32.2	31.5
4X	30.8	30.3	29.8	29.4	29.1
5X	28.7	28.4	28.1	27.9	27.7
6X	27.5	27.3	27.1	26.8	26.5
7X	26.2	25.9	25.6	25.4	25.2
8X	25.0	24.8	24.6	24.4	24.1
9X	23.7	23.4	22.7	21.5	20.1
10X	19.0				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	48.6	43.4	41.4	39.7	38.2
1X	37.0	36.0	35.0	33.9	32.9
2X	32.0	31.1	30.2	29.4	28.6
3X	27.9	27.2	26.6	25.9	25.3
4X	24.7	24.1	23.5	23.0	22.5
5X	22.0	21.5	21.0	20.6	20.1
6X	19.6	19.2	18.7	18.3	17.8
7X	17.4	17.0	16.5	16.0	15.5
8X	14.8	8.8	2.9	1.7	1.3
9X	1.0	0.8	0.7	0.6	0.6
10X	0.5				

Table B13

Speed Profile (mph) for MC1, 4x4, 14.00 R20XS Tires, 435-hp for Mid-East Study Area

Dry Normal Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	54.9
7X	54.8	54.8	54.6	54.1	53.6
8X	53.1	52.5	51.8	51.2	50.2
9X	48.7	46.6	43.4	40.5	38.2
10X	36.1				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	54.9	54.8	54.6	54.3	53.9
6X	53.5	53.2	52.4	51.5	50.6
7X	49.8	48.9	47.8	46.6	45.4
8X	43.8	41.6	39.7	38.1	36.6
9X	35.4	34.2	33.2	32.2	31.4
10X	30.3				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	34.0	34.0
1X	33.8	32.5	31.3	30.4	29.8
2X	29.3	28.9	28.6	28.2	27.7
3X	27.0	26.4	25.9	25.4	25.1
4X	24.7	24.4	24.2	24.0	23.7
5X	23.4	23.1	22.8	22.5	22.2
6X	22.0	21.8	21.6	21.4	21.3
7X	21.1	21.0	20.8	20.7	20.6
8X	20.5	20.3	20.2	20.1	19.9
9X	19.8	19.7	19.6	19.4	19.2
10X	18.3				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	40.6	38.5	37.9	37.6
1X	37.4	36.8	35.5	34.1	32.9
2X	31.7	30.7	29.6	28.8	28.0
3X	27.3	26.7	26.1	25.5	25.1
4X	24.7	24.3	24.0	23.7	23.4
5X	23.1	22.8	22.6	22.3	22.1
6X	21.8	21.6	21.4	21.1	20.9
7X	20.7	20.5	20.2	20.0	19.8
8X	19.5	19.3	19.0	18.8	18.5
9X	18.1	17.5	7.6	3.0	1.9
10X	1.4				

Wet-Wet Slippery Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	54.9	54.8
7X	54.8	54.6	54.2	53.5	52.8
8X	52.1	51.3	50.5	49.7	48.6
9X	46.9	44.6	41.2	38.3	35.9
10X	33.9				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.6	50.6	50.5	50.2	49.8
6X	49.4	49.1	48.3	47.5	46.7
7X	45.9	45.0	44.0	42.9	41.7
8X	40.3	38.3	36.5	35.0	33.6
9X	32.5	31.4	30.4	29.6	28.8
10X	27.8				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	33.8	33.5
1X	32.3	31.1	30.2	29.5	29.0
2X	28.6	28.3	28.0	27.5	27.0
3X	26.4	25.8	25.4	25.0	24.6
4X	24.3	24.1	23.8	23.6	23.3
5X	23.0	22.7	22.4	22.2	21.9
6X	21.7	21.5	21.3	21.2	21.0
7X	20.9	20.8	20.6	20.5	20.4
8X	20.3	20.2	20.0	19.9	19.8
9X	19.6	19.5	19.4	19.3	19.0
10X	18.2				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	47.7	43.9	43.9	43.9	43.9
1X	42.8	40.7	38.3	36.0	34.2
2X	32.5	31.1	30.0	29.0	28.1
3X	27.2	26.5	25.9	25.4	24.9
4X	24.5	24.1	23.8	23.4	23.1
5X	22.7	22.4	22.1	21.8	21.5
6X	21.2	21.0	20.7	20.4	20.1
7X	19.8	19.5	19.2	18.9	18.6
8X	18.3	18.0	17.7	17.3	16.9
9X	16.4	15.1	3.6	2.1	1.5
10X	1.2				

Sand Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	[illegible]
6X	55.0	55.0	55.0	[illegible]	[illegible]
7X	54.8	54.5	54.0	[illegible]	[illegible]
8X	51.7	50.8	49.9	[illegible]	[illegible]
9X	46.1	43.8	40.4	[illegible]	[illegible]
10X	33.0				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.6	50.6	50.5	50.2	49.8
6X	49.4	49.1	48.3	47.5	46.7
7X	45.9	45.0	44.0	42.9	41.7
8X	40.3	38.3	36.5	35.0	33.6
9X	32.5	31.4	30.4	29.6	28.8
10X	27.8				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	33.6	32.2	30.3	29.1
1X	28.3	27.8	27.4	27.0	26.7
2X	26.4	26.0	25.5	24.9	24.5
3X	24.1	23.8	23.5	23.2	23.0
4X	22.7	22.4	22.1	21.8	21.5
5X	21.3	21.1	20.9	20.7	20.6
6X	20.4	20.3	20.2	20.1	20.0
7X	19.8	19.7	19.6	19.4	19.3
8X	19.2	19.0	18.7	7.3	2.8
9X	1.7	1.3	1.0	0.9	0.7
10X	0.7				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	44.2	30.4	26.9	24.5	23.1
1X	22.1	21.5	21.0	20.5	20.1
2X	19.7	19.3	18.9	18.4	18.0
3X	17.7	17.4	17.1	16.9	16.6
4X	16.4	16.2	16.1	15.9	15.7
5X	15.6	15.4	15.3	15.2	15.1
6X	14.9	14.8	14.6	14.4	14.2
7X	13.9	13.7	13.5	13.1	4.8
8X	2.2	1.5	1.1	0.9	0.8
9X	0.7	0.6	0.5	0.5	0.5
10X	0.4				

Table B14

Speed Profile (mph) for MC2, 4x4, 14.00 R20XS Tires, 655-hp for Mid-East Study Area

Dry Normal Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	55.0
7X	55.0	55.0	54.8	54.3	53.8
8X	53.3	52.7	52.0	51.3	50.4
9X	48.9	46.7	43.5	40.6	38.2
10X	36.2				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	54.7	54.3
6X	53.9	53.5	52.7	51.8	50.9
7X	50.1	49.1	48.0	46.8	45.5
8X	44.0	41.8	39.9	38.2	36.8
9X	35.5	34.3	33.3	32.3	31.5
10X	30.4				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	34.0	34.0
1X	34.0	33.0	31.7	30.7	30.0
2X	29.5	29.1	28.8	28.5	27.9
3X	27.2	26.6	26.0	25.6	25.2
4X	24.9	24.6	24.3	24.1	23.8
5X	23.5	23.1	22.8	22.6	22.3
6X	22.1	21.9	21.7	21.5	21.3
7X	21.2	21.0	20.9	20.8	20.7
8X	20.5	20.4	20.2	20.1	20.0
9X	19.8	19.7	19.6	19.5	19.2
10X	18.3				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	41.2	38.8	38.1	37.7
1X	37.5	36.9	35.6	34.2	33.0
2X	31.8	30.7	29.7	28.9	28.1
3X	27.4	26.7	26.1	25.6	25.1
4X	24.7	24.3	24.0	23.7	23.4
5X	23.1	22.8	22.6	22.3	22.1
6X	21.8	21.6	21.4	21.1	20.9
7X	20.7	20.5	20.3	20.0	19.8
8X	19.6	19.3	19.0	18.8	18.5
9X	18.1	17.5	7.6	3.0	1.9
10X	1.4				

Wet-Wet Slippery Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	55.0
7X	55.0	54.8	54.4	53.6	52.9
8X	52.3	51.5	50.6	49.8	48.7
9X	47.0	44.7	41.3	38.4	36.0
10X	33.9				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.7	50.7	50.7	50.4	50.0
6X	49.6	49.3	48.5	47.6	46.9
7X	46.0	45.2	44.1	43.0	41.8
8X	40.4	38.3	36.6	35.0	33.7
9X	32.5	31.4	30.5	29.6	28.8
10X	27.8				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	34.0	34.0
1X	33.8	32.6	31.4	30.5	29.8
2X	29.3	29.0	28.6	28.3	27.8
3X	27.0	26.4	25.9	25.5	25.1
4X	24.8	24.5	24.2	24.0	23.7
5X	23.4	23.1	22.8	22.5	22.3
6X	22.0	21.8	21.6	21.5	21.3
7X	21.1	21.0	20.9	20.7	20.6
8X	20.5	20.4	20.2	20.1	19.9
9X	19.8	19.7	19.6	19.4	19.2
10X	18.3				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	48.2	44.0	43.9	43.9	43.9
1X	42.9	40.9	38.5	36.2	34.4
2X	32.8	31.3	30.2	29.1	28.2
3X	27.4	26.7	26.0	25.5	25.0
4X	24.6	24.2	23.9	23.5	23.1
5X	22.8	22.5	22.2	21.9	21.6
6X	21.3	21.0	20.8	20.5	20.2
7X	19.9	19.6	19.3	19.0	18.7
8X	18.3	18.0	17.7	17.3	16.9
9X	16.4	9.9	3.2	1.9	1.4
10X	1.1				

Sand Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	55.0
7X	55.0	54.7	54.2	53.4	52.6
8X	51.9	51.0	50.1	49.1	48.0
9X	46.2	43.9	40.4	37.5	35.1
10X	33.0				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.7	50.7	50.7	50.4	50.0
6X	49.6	49.3	48.5	47.6	46.9
7X	46.0	45.2	44.1	43.0	41.8
8X	40.4	38.3	36.6	35.0	33.7
9X	32.5	31.4	30.5	29.6	28.8
10X	27.8				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	33.8	32.6	31.6
1X	30.2	29.3	28.7	28.2	27.9
2X	27.6	27.3	26.6	25.9	25.3
3X	24.9	24.5	24.1	23.8	23.6
4X	23.3	22.9	22.5	22.2	21.9
5X	21.7	21.4	21.2	21.0	20.9
6X	20.7	20.6	20.4	20.3	20.2
7X	20.0	19.9	19.7	19.6	19.5
8X	19.3	19.2	18.5	4.4	2.2
9X	1.5	1.2	0.9	0.8	0.7
10X	0.6				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	44.3	31.3	27.7	25.2	23.6
1X	22.5	21.8	21.3	20.7	20.3
2X	19.8	19.4	19.0	18.5	18.0
3X	17.7	17.3	17.0	16.8	16.5
4X	16.3	16.1	15.9	15.7	15.6
5X	15.4	15.3	15.2	15.0	14.9
6X	14.7	14.5	14.3	14.1	13.9
7X	13.6	13.3	7.0	2.5	1.5
8X	1.1	0.9	0.8	0.7	0.6
9X	0.5	0.5	0.4	0.4	0.4
10X	0.4				

Table B15

Speed Profile (mph) for MC3, 4x4, 16.00 R20XS Tires, 435-hp for Mid-East Study Area

Dry Normal Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	54.8
7X	54.7	54.6	54.3	53.8	53.4
8X	52.9	52.3	51.6	51.0	50.1
9X	48.6	46.4	43.2	40.4	38.1
10X	36.1				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	54.9	54.7	54.6	54.2	53.8
6X	53.5	53.1	52.3	51.4	50.6
7X	49.8	48.8	47.7	46.5	45.3
8X	43.8	41.6	39.7	38.1	36.6
9X	35.3	34.2	33.2	32.2	31.4
10X	30.3				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	34.0	34.0
1X	33.8	32.5	31.2	30.4	29.7
2X	29.3	28.9	28.6	28.2	27.7
3X	27.0	26.4	25.9	25.4	25.0
4X	24.7	24.4	24.2	23.9	23.7
5X	23.4	23.0	22.7	22.5	22.2
6X	22.0	21.8	21.6	21.4	21.3
7X	21.1	21.0	20.8	20.7	20.6
8X	20.5	20.3	20.2	20.1	19.9
9X	19.8	19.7	19.6	19.4	19.2
10X	18.3				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	40.5	38.5	37.9	37.6
1X	37.4	36.8	35.5	34.1	32.9
2X	31.7	30.6	29.6	28.8	28.0
3X	27.3	26.7	26.1	25.5	25.1
4X	24.7	24.3	24.0	23.7	23.4
5X	23.1	22.8	22.6	22.3	22.1
6X	21.8	21.6	21.4	21.1	20.9
7X	20.7	20.4	20.2	20.0	19.8
8X	19.5	19.3	19.0	18.8	18.5
9X	18.1	17.6	17.0	4.6	2.4
10X	1.6				

Wet-Wet Slippery Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	54.8	54.7
7X	54.5	54.4	54.0	53.2	52.6
8X	51.9	51.2	50.3	49.5	48.4
9X	46.8	44.5	41.1	38.2	35.8
10X	33.8				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.6	50.5	50.5	50.2	49.8
6X	49.4	49.1	48.3	47.4	46.7
7X	45.9	45.0	44.0	42.8	41.7
8X	40.3	38.2	36.5	35.0	33.6
9X	32.4	31.4	30.4	29.6	28.8
10X	27.8				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	33.8	33.5
1X	32.4	31.2	30.2	29.5	29.0
2X	28.6	28.3	28.0	27.5	27.0
3X	26.3	25.8	25.4	25.0	24.6
4X	24.3	24.1	23.8	23.6	23.3
5X	23.0	22.7	22.4	22.2	21.9
6X	21.7	21.5	21.4	21.2	21.0
7X	20.9	20.8	20.6	20.5	20.4
8X	20.3	20.2	20.0	19.9	19.8
9X	19.7	19.5	19.4	19.3	19.0
10X	18.2				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	47.0	43.9	43.8	43.8	43.8
1X	42.7	40.6	38.2	36.0	34.2
2X	32.6	31.2	30.1	29.1	28.1
3X	27.3	26.6	26.0	25.5	25.0
4X	24.6	24.2	23.8	23.5	23.1
5X	22.8	22.5	22.2	21.9	21.6
6X	21.3	21.0	20.8	20.5	20.2
7X	19.9	19.6	19.3	19.0	18.7
8X	18.4	18.1	17.8	17.5	17.1
9X	16.7	16.2	10.1	3.3	2.0
10X	1.4				

Sand Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	54.8	54.7
7X	54.5	54.3	53.8	53.0	52.2
8X	51.5	50.7	49.8	48.9	47.7
9X	46.0	43.7	40.3	37.4	34.9
10X	32.9				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.6	50.5	50.5	50.2	49.8
6X	49.4	49.1	48.3	47.4	46.7
7X	45.9	45.0	44.0	42.8	41.7
8X	40.3	38.2	36.5	35.0	33.6
9X	32.4	31.4	30.4	29.6	28.8
10X	27.8				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	33.8	32.6	30.7	29.6
1X	28.7	28.1	27.7	27.3	27.0
2X	26.8	26.4	26.0	25.5	24.9
3X	24.5	24.2	23.9	23.6	23.4
4X	23.1	22.9	22.5	22.2	21.9
5X	21.7	21.4	21.2	21.1	20.9
6X	20.7	20.6	20.4	20.3	20.2
7X	20.1	20.0	19.8	19.7	19.6
8X	19.4	19.3	19.2	18.9	8.4
9X	3.0	1.8	1.3	1.1	0.9
10X	0.8				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	44.5	31.4	27.7	25.3	23.8
1X	22.8	22.0	21.4	21.0	20.6
2X	20.2	19.8	19.4	19.1	18.7
3X	18.4	18.1	17.9	17.6	17.4
4X	17.2	17.1	16.9	16.7	16.6
5X	16.4	16.3	16.2	16.1	16.0
6X	15.8	15.7	15.6	15.4	15.3
7X	15.1	14.9	14.8	14.6	14.3
8X	14.1	13.8	13.4	7.4	2.8
9X	1.7	1.3	1.0	0.9	0.7
10X	0.7				

Table B16

Speed Profile (mph) for MC4, 4x4, 16.00 R20XS Tires, 655-hp for Mid-East Study Area

Dry Normal Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	55.0
7X	55.0	55.0	54.8	54.3	53.8
8X	53.3	52.7	52.0	51.3	50.4
9X	48.9	46.7	43.5	40.7	38.3
10X	36.2				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	54.7	54.3
6X	53.9	53.5	52.7	51.8	50.9
7X	50.1	49.1	48.0	46.8	45.6
8X	44.0	41.8	39.9	38.2	36.8
9X	35.5	34.3	33.3	32.3	31.5
10X	30.4				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	34.0	34.0
1X	34.0	33.0	31.7	30.8	30.1
2X	29.5	29.1	28.8	28.5	27.9
3X	27.2	26.6	26.0	25.6	25.2
4X	24.9	24.6	24.3	24.1	23.8
5X	23.5	23.2	22.8	22.6	22.3
6X	22.1	21.9	21.7	21.5	21.3
7X	21.2	21.0	20.9	20.8	20.7
8X	20.5	20.4	20.2	20.1	20.0
9X	19.8	19.7	19.6	19.5	19.2
10X	18.3				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	41.2	38.8	38.1	37.7
1X	37.5	36.9	35.6	34.2	33.0
2X	31.8	30.7	29.7	28.9	28.1
3X	27.4	26.7	26.1	25.6	25.1
4X	24.7	24.3	24.0	23.7	23.4
5X	23.1	22.8	22.6	22.3	22.1
6X	21.8	21.6	21.4	21.1	20.9
7X	20.7	20.5	20.3	20.0	19.8
8X	19.6	19.3	19.1	18.8	18.5
9X	18.1	17.6	17.0	4.6	2.4
10X	1.6				

Wet-Wet Slippery Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	55.0
7X	55.0	54.8	54.4	53.7	53.0
8X	52.3	51.5	50.7	49.8	48.7
9X	47.0	44.7	41.3	38.4	36.0
10X	33.9				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.7	50.7	50.7	50.4	50.0
6X	49.6	49.3	48.5	47.6	46.9
7X	46.0	45.2	44.1	43.0	41.8
8X	40.4	38.3	36.6	35.0	33.7
9X	32.5	31.4	30.5	29.6	28.8
10X	27.8				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	34.0	34.0	34.0
1X	33.8	32.6	31.3	30.5	29.8
2X	29.3	28.9	28.6	28.3	27.7
3X	27.0	26.4	25.9	25.5	25.1
4X	24.8	24.5	24.2	24.0	23.7
5X	23.4	23.1	22.8	22.5	22.3
6X	22.0	21.8	21.6	21.5	21.3
7X	21.1	21.0	20.9	20.7	20.6
8X	20.5	20.4	20.2	20.1	19.9
9X	19.8	19.7	19.6	19.4	19.2
10X	18.3				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	47.4	43.9	43.8	43.8	43.8
1X	42.8	40.9	38.5	36.2	34.5
2X	32.9	31.4	30.3	29.3	28.3
3X	27.5	26.8	26.2	25.6	25.1
4X	24.7	24.3	23.9	23.6	23.2
5X	22.9	22.6	22.3	22.0	21.7
6X	21.4	21.1	20.8	20.6	20.3
7X	20.0	19.7	19.4	19.1	18.8
8X	18.5	18.2	17.9	17.5	17.1
9X	16.7	16.2	10.2	3.3	2.0
10X	1.4				

Sand Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	55.0
7X	55.0	54.7	54.3	53.4	52.6
8X	51.9	51.0	50.1	49.2	48.0
9X	46.3	43.9	40.5	37.5	35.1
10X	33.0				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.7	50.7	50.7	50.4	50.0
6X	49.6	49.3	48.5	47.6	46.9
7X	46.0	45.2	44.1	43.0	41.8
8X	40.4	38.3	36.6	35.0	33.7
9X	32.5	31.4	30.5	29.6	28.8
10X	27.8				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	34.0	34.0	33.9	33.1	32.3
1X	31.0	29.9	29.2	28.7	28.3
2X	28.0	27.7	27.2	26.6	25.9
3X	25.4	25.0	24.6	24.3	24.0
4X	23.7	23.4	23.0	22.7	22.4
5X	22.1	21.8	21.6	21.4	21.2
6X	21.0	20.9	20.7	20.6	20.5
7X	20.4	20.2	20.1	19.9	19.8
8X	19.6	19.5	19.3	19.0	8.5
9X	3.0	1.8	1.3	1.1	0.9
10X	0.8				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	32.5	28.6	26.5	24.8
1X	23.6	22.7	22.1	21.6	21.1
2X	20.7	20.2	19.8	19.4	19.0
3X	18.7	18.4	18.1	17.9	17.6
4X	17.4	17.2	17.0	16.9	16.7
5X	16.5	16.4	16.3	16.2	16.1
6X	15.9	15.8	15.7	15.5	15.4
7X	15.2	15.0	14.8	14.6	14.4
8X	14.2	13.9	13.6	5.3	2.4
9X	1.6	1.2	1.0	0.8	0.7
10X	0.6				

Table B17

Speed Profile (mph) for MC5, 6x6, 14.00 R20XS Tires, 435-hp for Mid-East Study Area

Dry Normal Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	54.9
7X	54.8	54.7	54.5	54.0	53.5
8X	53.0	52.4	51.8	51.1	50.2
9X	48.7	46.5	43.3	40.5	38.1
10X	36.1				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	54.9	54.7	54.6	54.3	53.9
6X	53.5	53.1	52.3	51.4	50.6
7X	49.8	48.8	47.8	46.6	45.3
8X	43.8	41.6	39.7	38.1	36.6
9X	35.3	34.2	33.2	32.2	31.4
10X	30.3				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	38.0	38.0	37.9
1X	37.2	35.2	33.8	32.8	32.1
2X	31.5	31.1	30.7	30.2	29.5
3X	28.8	28.3	27.8	27.4	27.1
4X	26.8	26.5	26.2	26.0	25.7
5X	25.4	25.1	24.9	24.6	24.4
6X	24.2	24.0	23.8	23.7	23.5
7X	23.4	23.3	23.1	23.0	22.9
8X	22.7	22.6	22.4	22.3	22.1
9X	22.0	21.9	21.8	21.5	21.1
10X	20.1				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	49.0	41.3	39.1	38.3	37.9
1X	37.6	37.3	36.4	35.1	34.0
2X	32.9	31.9	31.0	30.3	29.6
3X	28.9	28.3	27.8	27.3	26.9
4X	26.6	26.2	25.9	25.6	25.3
5X	25.0	24.7	24.5	24.2	23.9
6X	23.7	23.4	23.1	22.9	22.6
7X	22.4	22.1	21.8	21.5	21.3
8X	20.9	20.6	20.2	19.8	19.3
9X	18.6	17.6	5.7	2.6	1.7
10X	1.3				

Wet-Wet Slippery Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	54.9	54.8
7X	54.7	54.5	54.1	53.4	52.7
8X	52.1	51.3	50.4	49.6	48.5
9X	46.8	44.6	41.2	38.3	35.9
10X	33.8				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.6	50.6	50.5	50.2	49.8
6X	49.4	49.1	48.3	47.4	46.7
7X	45.9	45.0	44.0	42.9	41.7
8X	40.3	38.2	36.5	35.0	33.6
9X	32.4	31.4	30.4	29.6	28.8
10X	27.8				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	38.0	37.1	36.3
1X	34.7	33.2	32.2	31.5	30.9
2X	30.5	30.2	29.8	29.1	28.5
3X	28.0	27.5	27.1	26.8	26.5
4X	26.2	26.0	25.7	25.4	25.1
5X	24.8	24.5	24.3	24.1	23.9
6X	23.7	23.6	23.4	23.3	23.1
7X	23.0	22.9	22.8	22.7	22.5
8X	22.4	22.2	22.1	22.0	21.8
9X	21.7	21.6	21.5	21.2	20.9
10X	19.9				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	46.9	44.7	44.6	44.6	44.6
1X	43.6	41.5	39.5	37.4	35.7
2X	34.1	32.8	31.8	30.8	30.0
3X	29.2	28.5	28.0	27.5	27.0
4X	26.6	26.2	25.9	25.5	25.2
5X	24.8	24.5	24.2	23.8	23.5
6X	23.2	22.9	22.5	22.2	21.9
7X	21.5	21.1	20.8	20.4	20.0
8X	19.6	19.1	18.6	18.1	17.6
9X	16.9	16.0	3.9	2.2	1.5
10X	1.2				

Sand Condition

Primary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	54.9	54.8
7X	54.7	54.4	54.0	53.1	52.4
8X	51.7	50.8	49.9	49.0	47.8
9X	46.1	43.7	40.3	37.4	35.0
10X	32.9				

Secondary Roads

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.6	50.6	50.5	50.2	49.8
6X	49.4	49.1	48.3	47.4	46.7
7X	45.9	45.0	44.0	42.9	41.7
8X	40.3	38.2	36.5	35.0	33.6
9X	32.4	31.4	30.4	29.6	28.8
10X	27.8				

Trails

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	37.2	35.0	32.5	31.1
1X	30.3	29.7	29.3	28.7	28.3
2X	28.0	27.5	27.0	26.5	26.2
3X	25.8	25.5	25.3	25.1	24.9
4X	24.6	24.3	24.0	23.8	23.5
5X	23.4	23.2	23.0	22.9	22.7
6X	22.6	22.5	22.3	22.2	22.1
7X	21.9	21.8	21.6	21.5	21.4
8X	21.2	21.0	20.7	20.2	8.0
9X	2.9	1.8	1.3	1.1	0.9
10X	0.8				

Off Road

PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	46.4	32.7	28.7	26.3	24.9
1X	24.0	23.5	23.0	22.5	22.1
2X	21.7	21.2	20.8	20.2	19.7
3X	19.2	18.9	18.5	18.2	17.9
4X	17.7	17.4	17.2	17.0	16.8
5X	16.6	16.5	16.3	16.2	16.1
6X	15.9	15.8	15.6	15.4	15.2
7X	15.0	14.7	14.4	14.1	13.8
8X	13.3	12.6	4.1	2.1	1.5
9X	1.1	0.9	0.8	0.7	0.6
10X	0.6				

Table B18

Speed Profile (mph) for MC6, 6x6, 14.00 R20XS Tires, 655-hp for Mid-East Study Area

Dry Normal Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	55.0
7X	55.0	55.0	54.8	54.3	53.8
8X	53.3	52.7	52.0	51.3	50.4
9X	48.9	46.7	43.5	40.6	38.2
10X	36.2				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	54.7	54.3
6X	53.9	53.5	52.7	51.7	50.9
7X	50.1	49.1	48.0	46.8	45.5
8X	44.0	41.8	39.9	38.2	36.8
9X	35.5	34.3	33.3	32.3	31.5
10X	30.4				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	38.0	38.0	38.0
1X	37.8	36.2	34.5	33.4	32.6
2X	32.0	31.5	31.0	30.7	29.9
3X	29.2	28.6	28.1	27.7	27.3
4X	27.0	26.7	26.5	26.2	26.0
5X	25.6	25.3	25.0	24.8	24.6
6X	24.4	24.2	24.0	23.8	23.7
7X	23.5	23.4	23.3	23.1	23.0
8X	22.8	22.7	22.5	22.4	22.2
9X	22.1	22.0	21.8	21.6	21.2
10X	20.1				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	49.0	42.1	39.5	38.5	38.1
1X	37.8	37.5	36.6	35.3	34.2
2X	33.1	32.1	31.1	30.4	29.7
3X	29.0	28.4	27.9	27.4	27.0
4X	26.6	26.3	26.0	25.7	25.4
5X	25.1	24.8	24.5	24.2	24.0
6X	23.7	23.4	23.2	22.9	22.7
7X	22.4	22.1	21.9	21.6	21.3
8X	21.0	20.6	20.3	19.8	19.3
9X	18.6	17.6	5.7	2.6	1.7
10X	1.3				

Wet-Wet Slippery Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	55.0
7X	55.0	54.8	54.4	53.6	52.9
8X	52.3	51.5	50.6	49.8	48.7
9X	47.0	44.7	41.3	38.4	36.0
10X	33.9				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.7	50.7	50.7	50.4	50.0
6X	49.6	49.3	48.5	47.6	46.9
7X	46.0	45.2	44.1	43.0	41.8
8X	40.4	38.3	36.6	35.0	33.7
9X	32.5	31.4	30.5	29.6	28.8
10X	27.8				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	38.0	38.0	38.0	37.7
1X	36.9	35.1	33.7	32.7	32.0
2X	31.4	31.0	30.6	30.2	29.5
3X	28.8	28.3	27.8	27.4	27.1
4X	26.8	26.5	26.2	26.0	25.8
5X	25.4	25.2	24.9	24.6	24.4
6X	24.2	24.0	23.9	23.7	23.5
7X	23.4	23.3	23.2	23.0	22.9
8X	22.7	22.6	22.4	22.3	22.1
9X	22.0	21.9	21.8	21.5	21.2
10X	20.1				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	46.9	44.8	44.7	44.7	44.7
1X	43.9	41.9	40.0	37.9	36.1
2X	34.6	33.2	32.1	31.2	30.3
3X	29.5	28.8	28.2	27.7	27.2
4X	26.8	26.4	26.0	25.7	25.3
5X	25.0	24.7	24.4	24.0	23.7
6X	23.4	23.0	22.7	22.4	22.0
7X	21.7	21.3	20.9	20.5	20.1
8X	19.7	19.2	18.7	18.2	17.7
9X	17.0	16.0	3.9	2.2	1.5
10X	1.2				

Sand Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	55.0
7X	55.0	54.7	54.2	53.4	52.6
8X	51.9	51.0	50.1	49.1	48.0
9X	46.2	43.9	40.4	37.5	35.1
10X	33.0				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.7	50.7	50.7	50.4	50.0
6X	49.6	49.3	48.5	47.6	46.9
7X	46.0	45.2	44.1	43.0	41.8
8X	40.4	38.3	36.6	35.0	33.7
9X	32.5	31.4	30.5	29.6	28.8
10X	27.8				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	38.0	37.8	37.2	35.5	34.1
1X	32.5	31.5	30.8	30.3	29.9
2X	29.6	29.2	28.5	27.9	27.4
3X	26.9	26.5	26.2	25.9	25.7
4X	25.4	25.0	24.7	24.4	24.2
5X	24.0	23.7	23.6	23.4	23.2
6X	23.1	22.9	22.8	22.7	22.5
7X	22.4	22.2	22.0	21.9	21.8
8X	21.6	21.4	21.1	20.5	7.0
9X	2.8	1.7	1.3	1.0	0.9
10X	0.8				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	47.1	33.9	29.8	27.2	25.6
1X	24.6	23.9	23.4	23.0	22.5
2X	22.1	21.7	21.2	20.7	20.1
3X	19.6	19.1	18.8	18.4	18.1
4X	17.8	17.6	17.3	17.1	16.9
5X	16.7	16.6	16.4	16.3	16.1
6X	16.0	15.8	15.7	15.5	15.2
7X	15.0	14.8	14.5	14.2	13.8
8X	13.3	6.0	2.5	1.6	1.2
9X	1.0	0.8	0.7	0.6	0.6
10X	0.5				

Table B19

Speed Profile (mph) for MC7, 6x6, 16.00 R20XS Tires, 435-hp for Mid-East Study Area

Dry Normal Condition

	Primary Roads					Secondary Roads					Trails					Off Road				
	PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	38.0	38.0	38.0	38.0	37.8	49.0	41.2	39.1	38.2	37.8
1X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	37.0	35.1	33.7	32.8	32.0	37.6	37.3	36.4	35.1	34.0
2X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	31.5	31.0	30.7	30.2	29.5	32.9	31.9	31.0	30.3	29.6
3X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	28.8	28.3	27.8	27.4	27.1	28.9	28.3	27.8	27.3	26.9
4X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	26.7	26.5	26.2	26.0	25.7	26.6	26.2	25.9	25.6	25.3
5X	55.0	54.9	54.8	54.7	54.7	54.9	54.7	54.6	54.3	53.9	25.4	25.1	24.8	24.6	24.4	25.0	24.7	24.5	24.2	23.9
6X	54.6	54.5	54.4	54.4	54.3	53.5	53.1	52.3	51.4	50.6	24.2	24.0	23.8	23.7	23.5	23.7	23.4	23.1	22.9	22.6
7X	54.1	54.0	53.8	53.3	52.9	49.8	48.9	47.8	46.6	45.3	23.4	23.2	23.1	23.0	22.9	22.4	22.1	21.8	21.6	21.3
8X	52.5	51.9	51.2	50.6	49.7	43.8	41.6	39.7	38.1	36.6	22.7	22.5	22.4	22.2	22.1	20.9	20.6	20.2	19.8	19.3
9X	48.2	46.2	43.0	40.2	37.9	35.4	34.2	33.2	32.2	31.4	22.0	21.9	21.7	21.5	21.1	18.7	17.7	15.2	3.7	2.1
10X	35.9					30.3					20.1					1.5				

Wet-Wet Slippery Condition

	Primary Roads					Secondary Roads					Trails					Off Road				
	PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	38.0	38.0	37.9	37.1	36.3	46.7	44.7	44.6	44.6	44.6
1X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	34.7	33.2	32.2	31.5	30.9	43.6	41.5	39.5	37.4	35.7
2X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	30.5	30.2	29.8	29.1	28.5	34.2	32.9	31.8	30.8	30.0
3X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	27.9	27.5	27.1	26.7	26.4	29.2	28.5	28.0	27.5	27.0
4X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	26.2	25.9	25.7	25.4	25.0	26.6	26.3	25.9	25.5	25.2
5X	54.9	54.8	54.7	54.6	54.5	50.6	50.6	50.5	50.2	49.8	24.8	24.5	24.3	24.1	23.9	24.9	24.5	24.2	23.9	23.5
6X	54.5	54.4	54.3	54.2	54.1	49.4	49.1	48.3	47.5	46.7	23.7	23.5	23.4	23.2	23.1	23.2	22.9	22.6	22.2	21.9
7X	54.0	53.8	53.5	52.8	52.1	45.9	45.0	44.0	42.9	41.7	23.0	22.9	22.8	22.7	22.5	21.5	21.1	20.8	20.4	20.0
8X	51.5	50.7	49.9	49.1	48.1	40.3	38.2	36.5	35.0	33.6	22.4	22.2	22.1	21.9	21.8	19.6	19.1	18.6	18.1	17.6
9X	46.4	44.2	40.9	38.0	35.7	32.4	31.4	30.4	29.6	28.8	21.7	21.6	21.4	21.2	20.9	17.0	16.1	6.6	2.8	1.8
10X	33.6					27.8					19.8					1.3				

Sand Condition

	Primary Roads					Secondary Roads					Trails					Off Road				
	PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	38.0	37.4	35.5	33.0	31.6	46.8	33.7	29.4	26.9	25.4
1X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	30.6	30.0	29.5	29.0	28.6	24.5	23.8	23.4	22.9	22.5
2X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	28.3	27.9	27.4	26.9	26.5	22.1	21.7	21.3	20.9	20.4
3X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	26.1	25.8	25.5	25.3	25.1	19.9	19.5	19.2	18.9	18.6
4X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	24.9	24.6	24.3	24.0	23.8	18.4	18.2	18.0	17.8	17.6
5X	54.9	54.8	54.7	54.6	54.5	50.6	50.6	50.5	50.2	49.8	23.6	23.4	23.2	23.1	22.9	17.4	17.2	17.1	16.9	16.8
6X	54.5	54.4	54.3	54.2	54.1	49.4	49.1	48.3	47.5	46.7	22.8	22.7	22.6	22.4	22.3	16.7	16.5	16.4	16.2	16.0
7X	54.0	53.8	53.3	52.5	51.8	45.9	45.0	44.0	42.9	41.7	22.1	22.0	21.8	21.7	21.6	15.8	15.6	15.4	15.1	14.8
8X	51.1	50.3	49.4	48.5	47.4	40.3	38.2	36.5	35.0	33.6	21.4	21.3	21.1	20.7	20.1	14.5	14.2	13.7	13.1	4.5
9X	45.7	43.4	40.0	37.2	34.8	32.4	31.4	30.4	29.6	28.8	8.5	3.0	1.9	1.4	1.1	2.3	1.5	1.2	1.0	0.8
10X	32.8					27.8					0.9					0.7				

Table B20

Speed Profile (mph) for MC8, 6x6, 16.00 R20XS Tires, 655-hp for Mid-East Study Area

Dry Normal Condition

	Primary Roads					Secondary Roads					Trails					Off Road				
	PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	38.0	38.0	38.0	38.0	38.0	49.0	42.1	39.5	38.5	38.1
1X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	37.8	36.2	34.6	33.4	32.6	37.8	37.5	36.6	35.3	34.2
2X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	32.0	31.5	31.1	30.7	29.9	33.1	32.1	31.1	30.4	29.7
3X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	29.2	28.6	28.1	27.7	27.3	29.0	28.4	27.9	27.4	27.0
4X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	27.0	26.7	26.5	26.2	26.0	26.6	26.3	26.0	25.7	25.4
5X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.7	54.3	25.6	25.3	25.0	24.8	24.6	25.1	24.8	24.5	24.2	24.0
6X	55.0	55.0	55.0	55.0	55.0	53.9	53.5	52.7	51.8	50.9	24.4	24.2	24.0	23.8	23.7	23.7	23.4	23.2	22.9	22.7
7X	55.0	55.0	54.8	54.3	53.8	50.1	49.1	48.0	46.8	45.6	23.5	23.4	23.3	23.1	23.0	22.4	22.1	21.9	21.6	21.3
8X	53.3	52.7	52.0	51.3	50.4	44.0	41.8	39.9	38.2	36.8	22.8	22.7	22.5	22.4	22.2	21.0	20.6	20.3	19.8	19.4
9X	48.9	46.7	43.5	40.7	38.3	35.5	34.3	33.3	32.3	31.5	22.1	22.0	21.8	21.6	21.2	18.7	17.8	15.2	3.7	2.1
10X	36.2					30.4					20.1					1.5				

Wet-Wet Slippery Condition

	Primary Roads					Secondary Roads					Trails					Off Road				
	PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	38.0	38.0	38.0	38.0	37.7	46.8	44.7	44.6	44.6	44.6
1X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	37.0	35.0	33.6	32.6	31.9	43.8	41.9	40.0	37.9	36.1
2X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	31.4	31.0	30.6	30.1	29.5	34.6	33.2	32.1	31.2	30.3
3X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	28.8	28.3	27.8	27.4	27.1	29.5	28.8	28.2	27.7	27.2
4X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	26.7	26.5	26.2	26.0	25.8	26.8	26.4	26.1	25.7	25.4
5X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.4	50.0	25.4	25.1	24.9	24.6	24.4	25.0	24.7	24.4	24.0	23.7
6X	55.0	55.0	55.0	55.0	55.0	49.6	49.3	48.5	47.6	46.9	24.2	24.0	23.8	23.7	23.5	23.4	23.0	22.7	22.4	22.0
7X	55.0	54.8	54.4	53.7	53.0	46.0	45.2	44.1	43.0	41.8	23.4	23.3	23.1	23.0	22.9	21.7	21.3	20.9	20.5	20.1
8X	52.3	51.5	50.7	49.8	48.7	40.4	38.3	36.6	35.0	33.7	22.7	22.6	22.4	22.3	22.1	19.7	19.2	18.7	18.2	17.7
9X	47.0	44.7	41.3	38.4	36.0	32.5	31.4	30.5	29.6	28.8	22.0	21.9	21.8	21.5	21.2	17.0	16.2	6.6	2.8	1.8
10X	33.9					27.8					20.1					1.3				

Sand Condition

	Primary Roads					Secondary Roads					Trails					Off Road				
	PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	38.0	38.0	37.6	36.2	35.0	49.0	35.2	30.6	28.2	26.5
1X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	33.2	32.0	31.2	30.7	30.2	25.4	24.6	24.0	23.6	23.1
2X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	29.9	29.6	29.1	28.4	27.8	22.7	22.3	21.8	21.4	21.0
3X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	27.4	27.0	26.6	26.3	26.0	20.5	20.0	19.6	19.3	19.0
4X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	25.8	25.5	25.1	24.8	24.5	18.7	18.5	18.3	18.0	17.8
5X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.4	50.0	24.3	24.1	23.9	23.7	23.5	17.6	17.5	17.3	17.1	17.0
6X	55.0	55.0	55.0	55.0	55.0	49.6	49.3	48.5	47.6	46.9	23.3	23.2	23.0	22.9	22.8	16.9	16.7	16.6	16.4	16.2
7X	55.0	54.7	54.3	53.4	52.6	46.0	45.2	44.1	43.0	41.8	22.6	22.5	22.3	22.1	22.0	16.0	15.8	15.5	15.3	15.0
8X	51.9	51.0	50.1	49.2	48.0	40.4	38.3	36.6	35.0	33.7	21.9	21.7	21.5	21.2	20.7	14.7	14.4	13.8	13.2	4.1
9X	46.3	43.9	40.5	37.5	35.1	32.5	31.4	30.5	29.6	28.8	8.6	3.0	1.9	1.4	1.1	2.2	1.5	1.2	0.9	0.8
10X	33.0					27.8					0.9					0.7				

Table B21

Speed Profile (mph) for XC9, 8x8, 14.00 R20XS Tires, 435-hp for Mid-East Study Area

Dry Normal Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	54.9
6X	54.9	54.9	54.9	54.9	54.8
7X	54.7	54.6	54.4	53.9	53.4
8X	52.9	52.3	51.7	51.0	50.1
9X	48.6	46.5	43.3	40.5	38.1
10X	36.1				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	54.9	54.7	54.6	54.2	53.8
6X	53.4	53.1	52.3	51.4	50.6
7X	49.7	48.8	47.7	46.5	45.3
8X	43.8	41.6	39.7	38.1	36.6
9X	35.3	34.2	33.2	32.2	31.4
10X	30.3				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	45.0	45.0	44.7	43.8
1X	42.3	41.0	40.1	39.5	39.0
2X	38.6	38.1	37.2	36.3	35.5
3X	34.9	34.3	33.8	33.4	33.1
4X	32.8	32.3	31.9	31.4	30.9
5X	30.4	30.0	29.7	29.3	29.0
6X	28.7	28.5	28.3	28.0	27.8
7X	27.6	27.5	27.3	27.2	26.9
8X	26.6	26.3	26.1	25.9	25.7
9X	25.4	25.2	25.0	24.6	24.1
10X	22.6				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	51.5	44.5	41.5	39.8	39.0
1X	38.5	38.2	37.8	37.5	36.9
2X	36.3	35.7	35.1	34.6	34.0
3X	33.4	32.9	32.4	32.0	31.6
4X	31.3	31.0	30.6	30.3	29.9
5X	29.5	29.1	28.8	28.4	28.1
6X	27.7	27.2	26.8	26.4	26.0
7X	25.6	25.2	24.8	24.4	24.0
8X	23.6	23.1	22.6	21.9	21.2
9X	20.3	18.8	5.5	2.6	1.7
10X	1.3				

Wet-Wet Slippery Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	54.9	54.9
6X	54.9	54.9	54.9	54.8	54.7
7X	54.6	54.4	54.0	53.3	52.6
8X	52.0	51.2	50.3	49.5	48.4
9X	46.8	44.5	41.1	38.3	35.8
10X	33.8				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.6	50.5	50.5	50.2	49.8
6X	49.4	49.0	48.3	47.4	46.7
7X	45.9	45.0	44.0	42.8	41.7
8X	40.3	38.2	36.5	35.0	33.6
9X	32.4	31.4	30.4	29.6	28.8
10X	27.8				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	44.8	44.1	42.1	40.6
1X	39.4	38.7	38.2	37.9	37.5
2X	37.1	36.3	35.4	34.7	34.1
3X	33.6	33.1	32.8	32.4	32.1
4X	31.7	31.1	30.6	30.2	29.7
5X	29.4	29.0	28.7	28.4	28.2
6X	27.9	27.7	27.5	27.3	27.2
7X	27.0	26.9	26.7	26.5	26.3
8X	26.0	25.8	25.5	25.3	25.1
9X	24.9	24.7	24.5	24.1	23.6
10X	22.2				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	46.7	44.7	44.6	44.6	44.6
1X	44.0	42.4	41.1	39.9	38.7
2X	37.7	36.9	36.1	35.3	34.5
3X	33.8	33.3	32.8	32.3	31.8
4X	31.4	30.9	30.4	30.0	29.5
5X	29.1	28.7	28.3	27.8	27.3
6X	26.8	26.4	25.9	25.4	24.9
7X	24.4	23.9	23.3	22.8	22.2
8X	21.6	21.0	20.4	19.7	19.0
9X	18.0	16.7	3.7	2.1	1.5
10X	1.2				

Sand Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	54.9	54.9
6X	54.9	54.9	54.9	54.8	54.7
7X	54.6	54.3	53.9	53.0	52.3
8X	51.6	50.7	49.8	48.9	47.8
9X	46.0	43.7	40.3	37.4	34.9
10X	32.9				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.6	50.5	50.5	50.2	49.8
6X	49.4	49.0	48.3	47.4	46.7
7X	45.9	45.0	44.0	42.8	41.7
8X	40.3	38.2	36.5	35.0	33.6
9X	32.4	31.4	30.4	29.6	28.8
10X	27.8				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	44.0	42.7	39.9	38.3	37.5
1X	36.7	35.7	34.9	34.2	33.6
2X	33.0	32.4	32.0	31.6	31.3
3X	31.0	30.7	30.4	29.9	29.5
4X	29.0	28.6	28.3	28.0	27.7
5X	27.4	27.2	27.0	26.8	26.6
6X	26.5	26.3	26.1	25.9	25.7
7X	25.4	25.2	25.0	24.8	24.6
8X	24.4	24.1	23.8	23.2	9.2
9X	3.0	1.9	1.4	1.1	0.9
10X	0.8				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	47.6	35.2	31.7	29.6	28.2
1X	27.1	26.4	25.9	25.4	25.0
2X	24.5	23.9	23.3	22.7	22.1
3X	21.4	20.8	20.3	19.9	19.5
4X	19.2	18.8	18.6	18.3	18.1
5X	17.8	17.6	17.4	17.2	17.1
6X	16.9	16.7	16.6	16.4	16.1
7X	15.9	15.7	15.4	15.1	14.7
8X	14.4	13.8	13.1	4.0	2.1
9X	1.5	1.1	0.9	0.8	0.7
10X	0.6				

Table B22

Speed Profile (mph) for MC10, 8x8, 14.00 R20XS Tires, 655-hp for Mid-East Study Area

Dry Normal Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	55.0
7X	55.0	55.0	54.8	54.3	53.8
8X	53.3	52.7	52.0	51.3	50.4
9X	48.9	46.7	43.5	40.6	38.2
10X	36.2				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	54.7	54.2
6X	53.8	53.5	52.7	51.7	50.9
7X	50.0	49.1	48.0	46.8	45.5
8X	44.0	41.8	39.9	38.2	36.7
9X	35.5	34.3	33.3	32.3	31.5
10X	30.4				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	45.0	45.0	45.0	44.7
1X	43.5	42.0	40.9	40.1	39.6
2X	39.1	38.7	38.2	37.2	36.3
3X	35.6	35.0	34.5	34.0	33.6
4X	33.3	33.0	32.7	32.1	31.6
5X	31.1	30.6	30.2	29.8	29.5
6X	29.2	28.9	28.7	28.4	28.2
7X	28.0	27.8	27.7	27.5	27.2
8X	26.9	26.6	26.4	26.1	25.9
9X	25.7	25.5	25.2	24.8	24.3
10X	22.8				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	51.5	45.2	42.2	40.3	39.3
1X	38.8	38.4	38.0	37.7	37.1
2X	36.5	35.9	35.4	34.8	34.2
3X	33.7	33.1	32.7	32.2	31.9
4X	31.5	31.2	30.8	30.5	30.1
5X	29.7	29.3	29.0	28.6	28.2
6X	27.8	27.4	27.0	26.6	26.1
7X	25.8	25.4	24.9	24.5	24.1
8X	23.7	23.2	22.7	22.0	21.3
9X	20.4	18.8	5.5	2.6	1.7
10X	1.3				

Wet-Wet Slippery Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	55.0
7X	54.9	54.8	54.4	53.6	52.9
8X	52.3	51.5	50.6	49.8	48.7
9X	47.0	44.7	41.3	38.4	36.0
10X	33.9				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.7	50.7	50.7	50.4	50.0
6X	49.6	49.3	48.5	47.6	46.9
7X	46.0	45.2	44.1	43.0	41.8
8X	40.4	38.3	36.6	35.0	33.7
9X	32.5	31.4	30.5	29.6	28.8
10X	27.8				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	45.0	45.0	44.4	43.2
1X	41.6	40.4	39.6	39.1	38.6
2X	38.3	37.7	36.8	36.0	35.2
3X	34.6	34.1	33.6	33.2	32.9
4X	32.6	32.3	31.9	31.3	30.8
5X	30.4	30.0	29.6	29.3	29.0
6X	28.7	28.5	28.2	28.0	27.8
7X	27.6	27.5	27.3	27.1	26.9
8X	26.6	26.3	26.1	25.9	25.6
9X	25.4	25.2	25.0	24.6	24.1
10X	22.6				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	46.8	44.7	44.6	44.6	44.6
1X	44.2	42.7	41.4	40.3	39.3
2X	38.2	37.4	36.5	35.7	34.9
3X	34.2	33.6	33.0	32.5	32.1
4X	31.7	31.2	30.7	30.3	29.9
5X	29.4	29.0	28.6	28.2	27.7
6X	27.2	26.7	26.2	25.7	25.2
7X	24.7	24.1	23.5	23.0	22.4
8X	21.8	21.2	20.6	19.9	19.2
9X	18.2	16.8	3.7	2.1	1.5
10X	1.2				

Sand Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	55.0	55.0	55.0	55.0
6X	55.0	55.0	55.0	55.0	55.0
7X	54.9	54.7	54.2	53.4	52.6
8X	51.9	51.0	50.1	49.1	48.0
9X	46.2	43.9	40.4	37.5	35.1
10X	33.0				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.7	50.7	50.7	50.4	50.0
6X	49.6	49.3	48.5	47.6	46.9
7X	46.0	45.2	44.1	43.0	41.8
8X	40.4	38.3	36.6	35.0	33.7
9X	32.5	31.4	30.5	29.6	28.8
10X	27.8				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	44.3	42.6	40.0	38.8
1X	38.1	37.5	37.2	36.8	36.4
2X	35.8	34.9	34.1	33.6	33.1
3X	32.7	32.3	32.0	31.7	31.2
4X	30.7	30.2	29.7	29.3	28.9
5X	28.6	28.3	28.1	27.8	27.6
6X	27.4	27.2	27.0	26.8	26.7
7X	26.4	26.1	25.8	25.6	25.4
8X	25.1	24.9	24.5	23.8	9.3
9X	3.1	1.9	1.4	1.1	0.9
10X	0.8				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	48.5	36.8	33.3	31.0	29.4
1X	28.2	27.3	26.7	26.1	25.7
2X	25.3	24.8	24.2	23.5	22.8
3X	22.1	21.4	20.9	20.4	20.0
4X	19.6	19.2	18.9	18.6	18.4
5X	18.1	17.9	17.7	17.5	17.3
6X	17.1	17.0	16.8	16.6	16.3
7X	16.1	15.8	15.5	15.2	14.9
8X	14.5	13.9	12.4	3.2	1.9
9X	1.3	1.1	0.9	0.8	0.7
10X	0.6				

Table B23

Speed Profile (mph) for MC11, 8x8, 16.00 R20XS Tires, 435-hp for Mid-East Study Area

Dry Normal Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	55.0	54.9	54.7	54.6	54.5
6X	54.3	54.2	54.1	54.0	53.9
7X	53.8	53.7	53.5	53.0	52.6
8X	52.1	51.6	50.9	50.3	49.4
9X	48.0	45.9	42.8	40.1	37.8
10X	35.8				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	54.9
5X	54.7	54.5	54.3	53.9	53.5
6X	53.2	52.8	52.0	51.2	50.4
7X	49.5	48.6	47.6	46.4	45.2
8X	43.6	41.5	39.6	38.0	36.5
9X	35.3	34.1	33.1	32.2	31.3
10X	30.2				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	45.0	44.9	44.1	43.1
1X	41.6	40.4	39.6	39.1	38.6
2X	38.3	37.8	36.8	36.0	35.2
3X	34.6	34.1	33.6	33.2	32.9
4X	32.6	32.2	31.7	31.2	30.7
5X	30.3	29.9	29.5	29.2	28.9
6X	28.6	28.4	28.1	27.9	27.7
7X	27.5	27.4	27.2	27.1	26.8
8X	26.5	26.3	26.0	25.8	25.6
9X	25.4	25.2	24.9	24.5	24.0
10X	22.6				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	51.5	44.3	41.3	39.6	38.9
1X	38.4	38.1	37.8	37.4	36.9
2X	36.2	35.6	35.0	34.5	33.9
3X	33.3	32.8	32.3	31.9	31.6
4X	31.2	30.9	30.6	30.2	29.8
5X	29.4	29.1	28.7	28.4	28.0
6X	27.6	27.2	26.8	26.4	26.0
7X	25.6	25.2	24.8	24.4	24.0
8X	23.6	23.1	22.5	21.9	21.2
9X	20.4	19.0	15.3	3.7	2.1
10X	1.5				

Wet-Wet Slippery Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	54.9	54.7	54.6	54.4	54.3
6X	54.1	54.0	53.9	53.8	53.7
7X	53.6	53.5	53.1	52.4	51.8
8X	51.2	50.5	49.7	48.9	47.8
9X	46.2	44.0	40.7	37.9	35.5
10X	33.5				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.5	50.4	50.3	50.0	49.6
6X	49.2	48.9	48.1	47.3	46.5
7X	45.7	44.9	43.8	42.7	41.6
8X	40.2	38.1	36.4	34.9	33.6
9X	32.4	31.3	30.4	29.5	28.7
10X	27.7				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	45.0	44.7	43.6	41.3	39.9
1X	38.9	38.3	37.9	37.6	37.2
2X	36.7	36.0	35.1	34.4	33.8
3X	33.4	32.9	32.6	32.3	32.0
4X	31.5	30.9	30.4	30.0	29.6
5X	29.2	28.9	28.6	28.3	28.0
6X	27.8	27.6	27.4	27.2	27.1
7X	26.9	26.7	26.5	26.3	26.1
8X	25.8	25.6	25.4	25.2	25.0
9X	24.8	24.5	24.3	23.9	23.4
10X	22.1				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	46.6	44.7	44.6	44.6	44.6
1X	43.9	42.3	41.0	39.8	38.6
2X	37.6	36.8	36.0	35.2	34.4
3X	33.7	33.2	32.7	32.2	31.8
4X	31.3	30.8	30.3	29.9	29.5
5X	29.0	28.6	28.2	27.7	27.3
6X	26.8	26.3	25.8	25.4	24.9
7X	24.4	23.8	23.2	22.7	22.2
8X	21.6	21.0	20.3	19.7	19.0
9X	18.1	16.9	6.6	2.8	1.8
10X	1.3				

Sand Condition

Primary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0
1X	55.0	55.0	55.0	55.0	55.0
2X	55.0	55.0	55.0	55.0	55.0
3X	55.0	55.0	55.0	55.0	55.0
4X	55.0	55.0	55.0	55.0	55.0
5X	54.9	54.7	54.6	54.4	54.3
6X	54.1	54.0	53.9	53.8	53.7
7X	53.6	53.4	53.0	52.2	51.5
8X	50.8	50.0	49.1	48.3	47.2
9X	45.5	43.2	39.9	37.0	34.7
10X	32.7				

Secondary Roads — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	50.7	50.7	50.7	50.7	50.7
1X	50.7	50.7	50.7	50.7	50.7
2X	50.7	50.7	50.7	50.7	50.7
3X	50.7	50.7	50.7	50.7	50.7
4X	50.7	50.7	50.7	50.7	50.7
5X	50.5	50.4	50.3	50.0	49.6
6X	49.2	48.9	48.1	47.3	46.5
7X	45.7	44.9	43.8	42.7	41.6
8X	40.2	38.1	36.4	34.9	33.6
9X	32.4	31.3	30.4	29.5	28.7
10X	27.7				

Trails — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	43.3	42.1	39.4	38.0	37.3
1X	36.7	35.5	34.6	33.9	33.4
2X	32.7	32.2	31.8	31.4	31.2
3X	30.9	30.6	30.3	29.8	29.4
4X	28.9	28.6	28.2	27.9	27.6
5X	27.4	27.1	26.9	26.8	26.6
6X	26.4	26.3	26.1	25.8	25.5
7X	25.3	25.1	24.8	24.6	24.4
8X	24.2	24.0	23.7	23.3	22.7
9X	21.3	14.6	3.6	2.1	1.5
10X	1.2				

Off Road — PERCENT TOTAL DISTANCE

	X=0	2	4	6	8
X	47.6	35.8	32.2	30.0	28.7
1X	27.7	27.1	26.5	25.9	25.4
2X	25.0	24.4	23.7	23.1	22.5
3X	21.9	21.3	20.8	20.4	20.0
4X	19.6	19.3	19.1	18.8	18.6
5X	18.3	18.1	17.9	17.7	17.6
6X	17.4	17.2	17.1	16.9	16.7
7X	16.4	16.2	15.9	15.6	15.3
8X	15.0	14.6	14.1	13.4	10.0
9X	3.1	1.9	1.4	1.1	0.9
10X	0.8				

Table B24

Speed Profile (mph) for MC12, 8x8, 16.00 R20XS Tires, 655-hp for Mid-East Study Area

Dry Normal Condition

	Primary Roads					Secondary Roads					Trails					Off Road				
	PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	45.0	45.0	45.0	45.0	44.6	51.5	45.2	42.1	40.2	39.3
1X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	43.4	41.8	40.8	40.0	39.5	38.7	38.4	38.0	37.7	37.1
2X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	39.0	38.6	38.1	37.1	36.2	36.5	35.9	35.4	34.8	34.2
3X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	35.5	34.9	34.4	33.9	33.6	33.7	33.1	32.6	32.2	31.9
4X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	33.2	32.9	32.6	32.0	31.5	31.5	31.1	30.8	30.5	30.1
5X	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.7	54.3	31.0	30.6	30.2	29.8	29.5	29.7	29.3	28.9	28.6	28.2
6X	55.0	55.0	55.0	55.0	55.0	53.9	53.5	52.7	51.8	50.9	29.2	28.9	28.6	28.4	28.2	27.8	27.4	27.0	26.6	26.1
7X	55.0	55.0	54.8	54.3	53.8	50.1	49.1	48.0	46.8	45.6	28.0	27.8	27.6	27.5	27.2	25.8	25.3	24.9	24.5	24.1
8X	53.3	52.7	52.0	51.3	50.4	44.0	41.8	39.9	38.2	36.8	26.9	26.6	26.4	26.1	25.9	23.7	23.2	22.7	22.0	21.3
9X	48.9	46.7	43.5	40.7	38.3	35.5	34.3	33.3	32.3	31.5	25.7	25.4	25.2	24.8	24.3	20.5	19.0	15.3	3.7	2.1
10X	36.2					30.4					22.8					1.5				

Wet-Wet Slippery Condition

	Primary Roads					Secondary Roads					Trails					Off Road				
	PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	45.0	45.0	45.0	43.6	42.4	46.7	44.7	44.6	44.6	44.6
1X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	40.9	39.9	39.2	38.7	38.3	44.1	42.7	41.4	40.3	39.3
2X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	38.0	37.5	36.5	35.7	35.0	38.2	37.3	36.5	35.6	34.9
3X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	34.4	33.9	33.4	33.1	32.7	34.1	33.5	33.0	32.5	32.1
4X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	32.4	32.0	31.6	31.1	30.6	31.6	31.2	30.7	30.3	29.8
5X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.4	50.0	30.2	29.8	29.4	29.1	28.8	29.4	29.0	28.6	28.1	27.7
6X	55.0	55.0	55.0	55.0	55.0	49.6	49.3	48.5	47.6	46.9	28.6	28.3	28.1	27.9	27.7	27.1	26.7	26.2	25.7	25.2
7X	55.0	54.8	54.4	53.7	53.0	46.0	45.2	44.1	43.0	41.8	27.5	27.3	27.2	27.0	26.8	24.7	24.1	23.5	23.0	22.4
8X	52.3	51.5	50.7	49.8	48.7	40.4	38.3	36.6	35.0	33.7	26.5	26.2	26.0	25.8	25.5	21.8	21.2	20.5	19.9	19.2
9X	47.0	44.7	41.3	38.4	36.0	32.5	31.4	30.5	29.6	28.8	25.3	25.1	24.9	24.5	24.0	18.3	17.0	6.6	2.8	1.8
10X	33.9					27.8					22.6					1.3				

Sand Condition

	Primary Roads					Secondary Roads					Trails					Off Road				
	PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE					PERCENT TOTAL DISTANCE				
	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8	X=0	2	4	6	8
X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	45.0	44.4	42.7	40.2	39.0	50.8	38.2	34.6	31.8	30.2
1X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	38.2	37.8	37.4	37.2	36.8	28.9	28.1	27.4	26.9	26.4
2X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	36.2	35.2	34.5	33.8	33.3	25.9	25.4	24.9	24.2	23.6
3X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	32.9	32.5	32.2	31.9	31.5	22.9	22.2	21.7	21.2	20.8
4X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.7	50.7	31.0	30.4	30.0	29.5	29.2	20.4	20.0	19.7	19.4	19.1
5X	55.0	55.0	55.0	55.0	55.0	50.7	50.7	50.7	50.4	50.0	28.8	28.5	28.2	28.0	27.7	18.9	18.6	18.4	18.2	18.0
6X	55.0	55.0	55.0	55.0	55.0	49.6	49.3	48.5	47.6	46.9	27.5	27.3	27.1	27.0	26.8	17.9	17.7	17.5	17.3	17.1
7X	55.0	54.7	54.3	53.4	52.6	46.0	45.2	44.1	43.0	41.8	26.6	26.3	26.0	25.7	25.5	16.9	16.6	16.3	16.0	15.7
8X	51.9	51.0	50.1	49.2	48.0	40.4	38.3	36.6	35.0	33.7	25.3	25.0	24.8	24.4	23.8	15.4	15.0	14.5	13.8	12.9
9X	46.3	43.9	40.5	37.5	35.1	32.5	31.4	30.5	29.6	28.8	22.9	15.4	3.6	2.1	1.5	3.5	2.0	1.4	1.1	0.9
10X	33.0					27.8					1.2					0.8				

Table B25

Percent of Distance NOGO on Trails and Percent of Area NOGO Off-Road in the Federal Republic of Germany Study Area

Vehicles	Trails: Insufficient Soil Strength	Trails: Insufficient Traction	Trails: Total NOGO	Off-Road: Insufficient Soil Strength	Off-Road: Insufficient Traction	Off-Road: Obstacle Interference and Traction	Off-Road: Combination of the following: Obstacle, Vegetation, Soil and Slope	Off-Road: Total
Dry Normal Condition								
MC1 (4x4) 14.00 R20XS (435-HP)	0	0	0	0.1	2.7	5.2	1.4	9.4
MC2 (4x4) 14.00 R20XS (655-HP)	0	0	0	0.1	2.7	5.3	1.4	9.5
MC3 (4x4) 16.00 R20XS (435-HP)	0	0	0	0	2.7	5.0	1.4	9.1
MC4 (4x4) 16.00 R20XS (655-HP)	0	0	0	0.1	2.7	4.9	1.4	9.1
MC5 (6x6) 14.00 R20XS (435-HP)	0	0	0	0	2.7	5.1	1.4	9.2
MC6 (6x6) 14.00 R20XS (655-HP)	0	0	0	0	2.7	5.1	1.4	9.2
MC7 (6x6) 16.00 R20XS (435-HP)	0	0	0	0	2.7	4.6	1.4	8.7
MC8 (6x6) 16.00 R20XS (655-HP)	0	0	0	0	2.7	4.6	1.4	8.7
MC9 (8x8) 14.00 R20XS (435-HP)	0	0	0	0	2.7	5.5	1.4	9.6
MC10 (8x8) 14.00 R20XS (655-HP)	0	0	0	0	2.7	5.5	1.4	9.6
MC11 (8x8) 16.00 R20XS (435-HP)	0	0	0	0	2.7	4.6	1.4	8.7
MC12 (8x8) 16.00 R20XS (655-HP)	0	0	0	0	2.7	4.6	1.4	8.7
Wet-Wet Slippery Condition								
MC1 (4x4) 14.00 R20XS (435-HP)	0	0	0	8.9	20.1	4.7	2.3	36.0
MC2 (4x4) 14.00 R20XS (655-HP)	1.5	0	1.5	21.2	23.8	4.2	2.6	51.8
MC3 (4x4) 16.00 R20XS (435-HP)	0	0	0	0.8	13.6	4.9	2.0	21.3
MC4 (4x4) 16.00 R20XS (655-HP)	0	0	0	0.8	20.9	4.8	2.2	28.7
MC5 (6x6) 14.00 R20XS (435-HP)	0	0	0	0.3	11.9	5.1	1.9	19.2
MC6 (6x6) 14.00 R20XS (655-HP)	0	0	0	0.5	12.2	5.1	1.9	19.7
MC7 (6x6) 16.00 R20XS (435-HP)	0	0	0	0.3	10.6	4.6	2.0	17.5
MC8 (6x6) 16.00 R20XS (655-HP)	0	0	0	0.3	10.9	4.6	1.9	17.7
MC9 (8x8) 14.00 R20XS (435-HP)	0	0	0	0.2	10.3	5.5	1.9	17.9
MC10 (8x8) 14.00 R20XS (655-HP)	0	0	0	0.2	10.5	5.6	1.9	18.2
MC11 (8x8) 16.00 R20XS (435-HP)	0	0	0	0.2	10.3	4.6	2.0	17.1
MC12 (8x8) 16.00 R20XS (655-HP)	0	0	0	0.2	10.1	4.6	2.2	17.1
Snow Condition								
MC1 (4x4) 14.00 R20XS (435-HP)	0	0	0	0	14.1	5.3	1.8	21.2
MC2 (4x4) 14.00 R20XS (655-HP)	0	0	0	0	14.1	5.3	1.8	21.2
MC3 (4x4) 16.00 R20XS (435-HP)	0	0	0	0	14.2	5.0	1.8	21.0
MC4 (4x4) 16.00 R20XS (655-HP)	0	0	0	0	14.2	5.0	1.8	21.0
MC5 (6x6) 14.00 R20XS (435-HP)	0	0	0	0	12.4	5.2	2.0	19.6
MC6 (6x6) 14.00 R20XS (655-HP)	0	0	0	0	12.4	5.2	2.0	19.6
MC7 (6x6) 16.00 R20XS (435-HP)	0	0	0	0	12.6	4.6	2.0	19.2
MC8 (6x6) 16.00 R20XS (655-HP)	0	0	0	0	12.6	4.6	1.8	19.0
MC9 (8x8) 14.00 R20XS (435-HP)	0	0	0	0	11.8	5.6	1.8	19.2
MC10 (8x8) 14.00 R20XS (655-HP)	0	0	0	0	11.8	5.6	1.8	19.2
MC11 (8x8) 16.00 R20XS (435-HP)	0	0	0	0	12.0	4.6	1.7	18.3
MC12 (8x8) 16.00 R20XS (655-HP)	0	0	0	0	12.0	4.6	1.7	18.3

Table B26

Percent of Distance NOGO on Trails and Percent of Area NOGO Off-Road in Mid-East Study Area

Vehicles	Trails: Insufficient Soil Strength	Trails: Insufficient Traction	Trails: Total NOGO	Off-Road: Insufficient Soil Strength	Off-Road: Insufficient Traction	Off-Road: Obstacle Interference and Traction	Off-Road: Combination of the following: Obstacle, Vegetation, and Slope	Off-Road: Total
	Dry Normal Condition							
MC1 (4x4) 14.00 R20XS (435-HP)	0	0	0	0	0	6.7	0	6.7
MC2 (4x4) 14.00 R20XS (655-HP)	0	0	0	0	0	6.7	0	6.7
MC3 (4x4) 16.00 R20XS (435-HP)	0	0	0	0	0	5.5	0	5.5
MC4 (4x4) 16.00 R20XS (655-HP)	0	0	0	0	0	5.5	0	5.5
MC5 (6x6) 14.00 R20XS (435-HP)	0	0	0	0	0	7.1	0	7.1
MC6 (6x6) 14.00 R20XS (655-HP)	0	0	0	0	0	7.1	0	7.1
MC7 (6x6) 16.00 R20XS (435-HP)	0	0	0	0	0	6.1	0	6.1
MC8 (6x6) 16.00 R20XS (655-HP)	0	0	0	0	0	6.1	0	6.1
MC9 (8x8) 14.00 R20XS (435-HP)	0	0	0	0	0	7.2	0	7.2
MC10 (8x8) 14.00 R20XS (655-HP)	0	0	0	0	0	7.2	0	7.2
MC11 (8x8) 16.00 R20XS (435-HP)	0	0	0	0	0	6.1	0	6.1
MC12 (8x8) 16.00 R20XS (655-HP)	0	0	0	0	0	6.1	0	6.1
	Wet-Wet Slippery Condition							
MC1 (4x4) 14.00 R20XS (435-HP)	0	0	0	0	1.0	6.6	0.4	8.0
MC2 (4x4) 14.00 R20XS (655-HP)	0	0	0	0.3	1.0	6.7	0.4	8.4
MC3 (4x4) 16.00 R20XS (435-HP)	0	0	0	0	0.4	5.5	0.4	6.3
MC4 (4x4) 16.00 R20XS (655-HP)	0	0	0	0	0.4	5.5	0.4	6.3
MC5 (6x6) 14.00 R20XS (435-HP)	0	0	0	0	0.4	7.1	0.4	7.9
MC6 (6x6) 14.00 R20XS (655-HP)	0	0	0	0	0.4	7.0	0.4	7.8
MC7 (6x6) 16.00 R20XS (435-HP)	0	0	0	0	0.4	6.0	0.4	6.8
MC8 (6x6) 16.00 R20XS (655-HP)	0	0	0	0	0.4	6.0	0.4	6.8
MC9 (8x8) 14.00 R20XS (435-HP)	0	0	0	0	0.4	7.2	0.4	8.0
MC10 (8x8) 14.00 R20XS (655-HP)	0	0	0	0	0.4	7.2	0.4	8.0
MC11 (8x8) 16.00 R20XS (435-HP)	0	0	0	0	0.4	6.0	0.4	6.8
MC12 (8x8) 16.00 R20XS (655-HP)	0	0	0	0	0.4	6.0	0.4	6.8
	Sand Condition							
MC1 (4x4) 14.00 R20XS (435-HP)	0	14.7	14.7	0	14.8	6.7	1.5	23.0
MC2 (4x4) 14.00 R20XS (655-HP)	0	15.5	15.5	0	18.4	6.7	1.4	26.5
MC3 (4x4) 16.00 R20XS (435-HP)	0	12.6	12.6	0	8.5	5.5	0.5	14.5
MC4 (4x4) 16.00 R20XS (655-HP)	0	12.6	12.6	0	8.6	5.5	0.9	15.0
MC5 (6x6) 14.00 R20XS (435-HP)	0	12.6	12.6	0	9.7	7.1	0.5	17.3
MC6 (6x6) 14.00 R20XS (655-HP)	0	12.8	12.8	0	11.0	7.1	0.6	18.7
MC7 (6x6) 16.00 R20XS (435-HP)	0	10.6	10.6	0	6.6	6.0	0.6	13.2
MC8 (6x6) 16.00 R20XS (655-HP)	0	10.6	10.6	0	6.7	6.0	0.8	13.5
MC9 (8x8) 14.00 R20XS (435-HP)	0	12.6	12.6	0	7.7	7.2	0.6	15.5
MC10 (8x8) 14.00 R20XS (655-HP)	0	12.6	12.6	0	8.3	7.2	0.5	16.0
MC11 (8x8) 16.00 R20XS (435-HP)	0	8.2	8.2	0	5.1	6.1	1.0	12.2
MC12 (8x8) 16.00 R20XS (655-HP)	0	8.2	8.2	0	4.8	6.1	1.0	11.9

Table B27

Performance Data for Study Vehicles Crossing Linear Features (Water Crossing) in the Federal Republic of Germany and Mid-East Study Areas

Vehicles	Hours Per Mile		
	Dry	Wet-Wet Slippery	Snow
	Federal Republic of Germany		
MC1 (4x4) 14.00 R20XS (435-HP)	0.1006	0.1063	0.1006
MC2 (4x4) 14.00 R20XS (655-HP)	0.1006	0.1063	0.1006
MC3 (4x4) 16.00 R20XS (435-HP)	0.1006	0.1063	0.1006
MC4 (4x4) 16.00 R20XS (655-HP)	0.1006	0.1063	0.1006
MC5 (6x6) 14.00 R20XS (435-HP)	0.1006	0.1061	0.1013
MC6 (6x6) 14.00 R20XS (655-HP)	0.1006	0.1061	0.1013
MC7 (6x6) 16.00 R20XS (435-HP)	0.1006	0.1061	0.1013
MC8 (6x6) 16.00 R20XS (655-HP)	0.1006	0.1061	0.1013
MC9 (8x8) 14.00 R20XS (435-HP)	0.0945	0.1061	0.1006
MC10 (8x8) 14.00 R20XS (655-HP)	0.1013	0.1079	0.1013
MC11 (8x8) 16.00 R20XS (435-HP)	0.1006	0.1061	0.1013
MC12 (8x8) 16.00 R20XS (655-HP)	0.0939	0.1061	0.1006
	Mid-East		
	Dry	Wet-Wet Slippery	Sand
MC1 (4x4) 14.00 R20XS (435-HP)	0.0247	0.0305	0.0247
MC2 (4x4) 14.00 R20XS (655-HP)	0.0247	0.0305	0.0247
MC3 (4x4) 16.00 R20XS (435-HP)	0.0242	0.0289	0.0242
MC4 (4x4) 16.00 R20XS (655-HP)	0.0242	0.0289	0.0242
MC5 (6x6) 14.00 R20XS (435-HP)	0.0242	0.0300	0.0242
MC6 (6x6) 14.00 R20XS (655-HP)	0.0242	0.0300	0.0242
MC7 (6x6) 16.00 R20XS (435-HP)	0.0237	0.0295	0.0237
MC8 (6x6) 16.00 R20XS (655-HP)	0.0237	0.0283	0.0237
MC9 (8x8) 14.00 R20XS (435-HP)	0.0237	0.0295	0.0237
MC10 (8x8) 14.00 R20XS (655-HP)	0.0237	0.0295	0.0237
MC11 (8x8) 16.00 R20XS (435-HP)	0.0237	0.0283	0.0237
MC12 (8x8) 16.00 R20XS (655-HP)	0.0237	0.0283	0.0237

APPENDIX C: COMPUTATION OF MOBILITY RATING SPEED FOR TACTICAL MOBILITY LEVELS

1. The equation for computing mobility rating speed is given as follows:

$$V_w = \frac{100}{\frac{P}{V_C} + P\left(T_X\right) + \frac{100 - P}{V_R}} \qquad \text{(C1)}$$

where

V_w = mobility rating speed, mph, for a vehicle performing a mission for a specific area and condition

P = the percentage of expected off-road operating distance

V_C = the speed from the off-road profile, mph, correspnding to C

C = the percentage of the off-road terrain that should be negotiable at a given tactical mobility level

T_X = the time spent crossing linear features (streams) for each mile of off-road terrain traversed, hr/mile

V_R = the speed from the on-road speed profile, mph, corresponding to R

R = the percentage of the road and trail network that should be negotiable

2. The speed from the on-road profile, V_R, is not directly available from this study, but can be computed using the speeds from the profiles of the primary and secondary roads and trails as follows:

$$V_R = \frac{100 - P}{\frac{P_P}{V_{PP}} + \frac{P_S}{V_{SP}} + \frac{P_T}{V_{TP}}} \qquad \text{(C2)}$$

where

P_P, P_S, P_T = percentage of the composite on-road and off-road network that are primary roads, secondary roads, and trails, respectively

V_{PP}, V_{SP}, V_{TP} = the speeds from the primary road, secondary road, and trail speed profiles, respectively, mph, that correspond to R

3. Equations C1 and C2 can be combined to yield the following:

$$V_W = \frac{100}{\frac{P}{V_C} + P\left(T_X\right) + \frac{P_P}{V_{PP}} + \frac{P_S}{V_{SP}} + \frac{P_T}{V_{TP}}} \qquad \text{(C3)}$$

4. For this report, values for P , P_P , P_S , and P_T in the Federal Republic of Germany and the HIMO Mid-East study areas can be found for each tactical mobility level in Table 5, main text. Values for V_C , V_{PP} , V_{SP} , and V_{TP} are available from the speed profiles for the study vehicles given in Tables B1-B24. Values for T_X for each vehicle are available in Table B27.

APPENDIX D: CONFIDENCE LEVEL OF SELECTED AMM SPEED DATA

1. Validation tests by WES (Schreiner and Willoughby 1976) have shown that the AMM speed predictions are within plus or minus 10 percent of the actual measured speeds for most terrain units (patches described by specific set of measured terrain data). The tests also indicated that predictions tended to be random (those which were not rectified by suitable changes to the model and rechecked). These data have also shown that the traverse data across several terrain units ranging from 1 to 4 miles in length have greater accuracy.

2. The statistical speeds V_{50}, V_{80}, and V_{90}, etc., can be thought of as represented by speeds over extremely long traverses. In order to explore the confidence associated with these speeds (i.e., how small a difference in the aggregated vehicle performances of two vehicles can be accepted as reliably reflecting their relative mobility performance ranking?), the following data were produced.

3. Speed predictions for the MC3, MC7, and MC11 vehicles in each terrain unit of the Lauterbach and Mafraq Quads during the dry condition were obtained using AMM. The V_{90} speeds were computed in the standard manner for each vehicle and study area. Twenty additional V_{90} speeds were then calculated for each vehicle in each study area by allowing the individual AMM terrain unit speeds to vary randomly within the range from plus 10 percent to minus 10 percent of the prediction. Given in Table D1 are the standard value of V_{90}, the maximum, minimum, and mean values of V_{90} from the 20 trials, and the associated standard deviation for the three vehicles for the dry conditions in the two countries.

4. These data indicate that the statistical V_{90} speeds are considerably better than the 10 percent error assumed for the individual terrain unit predictions because of the probability that speed errors in a series of terrain units in a given vehicle and study area will compensate one another. The data support the idea that differences in V_{50}, V_{80}, and V_{90} speeds among vehicles of 0.2 to 0.5 can be used with high confidence to assert that the "faster" vehicle will have better mobility performance than that of the "slower" in the stated terrain and conditions.

Table D1

V_{90} Speed Data for MC3, MC7, and MC11 in Lauterbach and Mafraq Quads

Vehicle	Standard Value	Values from Perturbation			
		Minimum	Maximum	Mean	Standard Deviation
Lauterbach					
MC3 (4x4)	16.628	16.502	16.609	16.556	0.032
MC7 (6x6)	15.768	15.667	15.792	15.722	0.035
MC11 (8x8)	15.927	15.788	15.947	15.871	0.039
Mafraq					
MC3 (4x4)	18.288	18.050	18.421	18.216	0.120
MC7 (6x6)	19.032	18.862	19.251	19.251	0.126
MC11 (8x8)	20.732	20.384	21.052	20.689	0.167

In accordance with letter from DAEN-RDC, DAEN-ASI dated 22 July 1977, Subject: Facsimile Catalog Cards for Laboratory Technical Publications, a facsimile catalog card in Library of Congress MARC format is reproduced below.

Randolph, Donald D.
Mobility analysis of selected lightweight armored wheeled concept vehicles / by Donald D. Randolph, Keafur Grimes (Geotechnical Laboratory, U.S. Army Engineer Waterways Experiment Station). -- Vicksburg, Miss. ; The Station ; Springfield, Va. ; available from NTIS, 1982.
113 p. in various pagings : ill. ; 27 cm. -- (Technical report ; GL-82-10)
Cover title.
"September 1982."
Final report.
"Prepared for U.S. Marine Corps, Development and Education Command."
Bibliography: p. 52.

1. All terrain vehicles. 2. Armored vehicles, Military. 3. Vehicles, Military. I. Grimes, Keafur. II. United States. Marine Corps. III. U.S. Army Engineer

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TA7.W34 no.GL-82-10